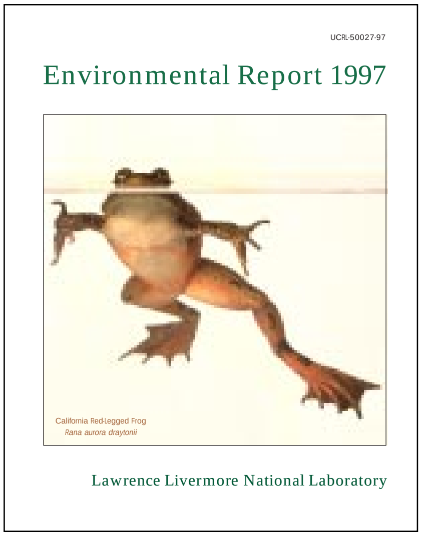
UCRL-50027-97

Environmental Report 1997

Data Supplement

California Red-Legged Frog
Rana aurora draytonii

Lawrence Livermore National Laboratory



Cover

The California red-legged frog (*Rana aurora draytonii*), a federally threatened species, established new populations at both the LLNL Livermore site and Site 300 in 1997. The California red-legged frog is the largest native frog in California, growing up to 138 mm, or more than 5 inches long. The original Calaveras jumping frog, it uses its strong legs to move long distances to find water during drought periods. At both LLNL sites its habitat is protected by use of project exclusion zones to protect breeding areas and by emplacement of shelter boxes. The editors thank wildlife photographers Liittschwager and Middleton for the use of their photograph.

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Environmental Report 1997

Data Supplement

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Preface

This Data Supplement to the Lawrence Livermore National Laboratory's (LLNL's) annual *Environmental Report* 1997 (called Volume 2 in previous years) was prepared for the U.S. Department of Energy. The main volume is intended to provide all information on LLNL's environmental impact and compliance activities that is of interest to most readers. The Data Supplement supports main volume summary data and is essentially a detailed data report that provides individual data points, where applicable. Some summary data are also included in the Data Supplement, and more detailed accounts are given of sample collection and analytical methods. Not all of the data in the Data Supplement tables have been reduced to the proper number of significant figures; however, summary data in both volumes are expressed using the proper number of significant figures.

The two volumes are organized in a parallel fashion to aid the reader in cross-referencing between them. This supplement includes more detailed information to support the nine chapters in the main volume that cover monitoring of air, air effluent, sewerable water, surface water, ground water, soil and sediment, vegetation and foodstuff, environmental radiation, and quality assurance. The other four chapters in the main volume have no supporting information in the Data Supplement.

As in our previous annual reports, data are presented in Système International (SI) units. In particular, the primary units used for radiological results are becquerels and sieverts for activity and dose, with curies and rem used secondarily ($1 \text{ Bq} = 2.7 \times 10^{-11} \text{ Ci}$; $1 \text{ Sv} = 100 \text{ rem}$).

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**There are no supplemental data in this chapter.
Please see the main volume for details about
Environmental Program Information.**

4

Air Effluent Monitoring

Arthur H. Biermann
Paula J. Tate

Air Effluent Sampling Methods

At the beginning of 1997, LLNL operated 103 continuously operating radiological sampling systems on air exhausts at nine facilities at the Livermore site (main volume, Table 4-1). These samplers are used to determine actual emissions from operations involving radioactive materials at the facilities and to verify the integrity of emission control systems.

Air samples for particulate emissions are extracted downstream of high-efficiency particulate air (HEPA) filters and prior to the discharge point to the atmosphere. In most cases, simple, filter-type aerosol collection systems are used. However, in some facilities (Buildings 251 and 332) continuous air monitors (CAMs) for alpha activity are used for sampling. In addition to collecting a sample of particles, the CAM units provide an alarm capability for the facility in the event of a release of alpha activity. Both types of sampling systems, the simple filter type and alpha alarm monitors, are used to monitor discharge points from Building 332. The air sampling systems in critical facilities would be switched to auxiliary power in the event of a power outage and continue to operate.

The sample filters, 47-mm-diameter membrane filters, are changed weekly or biweekly depending on the facility. After sample collection, filters are placed in glassine envelopes; each envelope is tagged with a unique bar code label. Filter samples are logged into the Hazards Control Department (HCD) sample tracking and reporting (STAR) computer system along with information, including location, equipment identification, bar code, sampling start date, sampling stop date, and flow rate. Sampling procedures are contained in the environmental section of the discipline action plan for a facility. Filters are analyzed at the HCD Radiological Measurements Laboratory (RML) for gross alpha and beta activity using gas proportional counters. Analysis is delayed for at least four days from sample termination to allow for the decay of naturally occurring radon daughters. For verification of the operation of the counting system, calibration sources, as well as background samples, are intermixed with the sample filters for analysis. Analytical techniques are consistent with EPA-recommended procedures. Further details of sampling and analysis are discussed in the *Environmental Monitoring Plan* (Tate et al. 1995).

4 Air Effluent Monitoring

Each stack of the Tritium Facility (Building 331) is monitored for tritium release by both a continuous monitoring alarm system and continuous molecular sieve samplers. The alarmed samplers, Overhoff ion chambers, provide real-time total tritium concentration release levels (HT and HTO combined). The sieve samplers, which can discriminate between tritiated water (HTO) vapor and tritiated hydrogen gas (HT), provide the values used for environmental reporting. Each sieve sampler (unalarmed) is in parallel with an alarmed monitor and consists of two molecular sieves. The first sieve collects tritiated water vapor; then a palladium-coated catalyst converts tritiated hydrogen to tritiated water and collects the tritiated water on a second sieve. Sieves are exchanged weekly. The sieve samples are logged into the HCD STAR sample tracking system and submitted to the HCD Analytical Laboratory, where tritiated water is baked out and collected. The retrieved tritium is analyzed by RML for beta activity using scintillation counting techniques.

Data

Annual summaries of gross alpha and gross beta data for each sampler at each monitored facility are summarized in **Tables 4-1** through **4-9**. The tables present the ratio of the number of results having activity concentration greater than the minimum detectable concentration (MDC) of the analysis to the total number of samples in the year, and the minimum, median, and maximum activity concentrations of the samples. A detailed discussion of these results is provided in the main volume of this report.

Table 4-1. Summary of gross alpha and gross beta in air effluent samples from monitored emission points at Building 166, 1997.

Sampler no.	No. >MDC[a]/ Total samples	Minimum (Bq/mL)	Median (Bq/mL)	Maximum (Bq/mL)
Gross alpha				
1	1/29	-1.14×10^{-11}	6.44×10^{-12}	8.73×10^{-11}
Gross beta				
1	5/29	-1.23×10^{-11}	6.11×10^{-11}	5.03×10^{-10}

a Minimum detectable concentration.

Table 4-2. Summary of gross alpha and gross beta in air effluent samples from monitored emission points at Building 175, 1997.

Sampler no.	No. >MDC[a]/ Total samples	Minimum (Bq/mL)	Median (Bq/mL)	Maximum (Bq/mL)
Gross alpha				
1	0/42	-1.62×10^{-11}	1.64×10^{-11}	5.55×10^{-11}
2	2/42	-2.16×10^{-11}	1.90×10^{-11}	1.05×10^{-10}
3	0/42	-1.41×10^{-11}	8.25×10^{-12}	5.51×10^{-11}
4	2/42	-3.14×10^{-11}	1.63×10^{-11}	4.66×10^{-11}
5	0/42	-2.87×10^{-11}	7.70×10^{-12}	4.59×10^{-11}
6	0/42	-3.67×10^{-11}	-1.64×10^{-13}	5.51×10^{-11}
Gross beta				
1	11/42	-4.33×10^{-12}	9.75×10^{-11}	4.55×10^{-10}
2	12/42	-9.47×10^{-12}	8.42×10^{-11}	4.11×10^{-10}
3	14/42	-3.77×10^{-11}	9.07×10^{-11}	3.07×10^{-10}
4	13/42	-4.26×10^{-11}	8.34×10^{-11}	1.19×10^{-9}
5	2/42	-8.40×10^{-11}	2.71×10^{-11}	2.93×10^{-10}
6	4/42	-6.33×10^{-11}	2.35×10^{-11}	1.75×10^{-10}

[a] Minimum detectable concentration.

Table 4-3. Summary of gross alpha and gross beta in air effluent samples from monitored emission points at Building 231, 1997.

Sampler no.	No. >MDC[a]/ Total samples	Minimum (Bq/mL)	Median (Bq/mL)	Maximum (Bq/mL)
Gross alpha				
Vault	0/33	-1.79×10^{-11}	5.70×10^{-12}	7.29×10^{-11}
Gross beta				
Vault	1/33	-2.82×10^{-11}	4.11×10^{-11}	3.53×10^{-10}

[a] Minimum detectable concentration.

Table 4-4. Summary of gross alpha and gross beta in air effluent samples from monitored emission points at Building 251, 1997.

Sampler no.	No. >MDC[(a)]/ Total samples	Minimum (Bq/mL)	Median (Bq/mL)	Maximum (Bq/mL)
Gross alpha				
1	0/22	-8.77×10^{-11}	5.55×10^{-11}	3.44×10^{-10}
2	4/22	1.98×10^{-11}	7.27×10^{-11}	2.36×10^{-10}
3	1/22	-3.35×10^{-11}	2.35×10^{-11}	1.22×10^{-10}
4	8/22	-6.18×10^{-12}	5.99×10^{-11}	1.72×10^{-10}
5	0/22	-3.11×10^{-10}	1.64×10^{-10}	5.51×10^{-10}
6	1/22	-6.36×10^{-11}	5.81×10^{-11}	4.51×10^{-10}
7	3/22	6.14×10^{-12}	5.25×10^{-11}	2.04×10^{-10}
8	1/22	-2.17×10^{-10}	1.09×10^{-10}	1.30×10^{-9}
10	4/22	-2.28×10^{-11}	1.12×10^{-10}	8.21×10^{-10}
11	1/22	-2.09×10^{-10}	2.51×10^{-10}	1.45×10^{-9}
12	0/22	-1.50×10^{-11}	9.84×10^{-12}	1.89×10^{-11}
13	0/22	-2.02×10^{-11}	1.98×10^{-11}	1.32×10^{-10}
14	3/22	-1.22×10^{-11}	5.81×10^{-11}	2.38×10^{-10}
15	0/22	-1.98×10^{-10}	1.92×10^{-10}	7.88×10^{-10}
16	2/22	-4.92×10^{-11}	6.01×10^{-11}	2.59×10^{-10}
17	1/22	-1.27×10^{-11}	3.44×10^{-11}	1.67×10^{-10}
18	3/22	-1.46×10^{-11}	1.97×10^{-11}	9.69×10^{-11}
19	0/22	-2.63×10^{-10}	2.17×10^{-10}	7.33×10^{-10}
20	2/22	-8.14×10^{-11}	1.57×10^{-11}	5.29×10^{-11}
21	0/22	-5.62×10^{-11}	8.23×10^{-11}	3.15×10^{-10}
22	0/22	-1.24×10^{-12}	1.24×10^{-11}	3.70×10^{-11}
23	0/22	-2.54×10^{-10}	2.00×10^{-10}	1.04×10^{-9}
24	0/22	-6.33×10^{-11}	2.61×10^{-11}	1.34×10^{-10}
25	0/22	-2.57×10^{-11}	2.91×10^{-11}	8.55×10^{-11}
26	0/22	-3.96×10^{-11}	1.34×10^{-11}	1.41×10^{-10}
27	0/22	-1.68×10^{-11}	6.85×10^{-11}	3.26×10^{-10}
28	1/22	-1.12×10^{-11}	8.53×10^{-11}	3.69×10^{-10}
29	2/22	-6.99×10^{-12}	4.01×10^{-11}	1.62×10^{-10}
30	1/22	-3.04×10^{-11}	3.10×10^{-11}	2.84×10^{-10}
31	0/22	-2.94×10^{-10}	2.27×10^{-10}	6.48×10^{-10}
32	0/22	-1.86×10^{-11}	3.66×10^{-11}	4.00×10^{-10}
33	11/22	1.25×10^{-12}	7.27×10^{-11}	2.60×10^{-10}
34	3/22	-2.15×10^{-11}	2.78×10^{-11}	1.27×10^{-10}
35	1/22	-2.21×10^{-11}	1.36×10^{-11}	1.15×10^{-10}
36	22/22	-1.88×10^{-10}	3.18×10^{-10}	5.74×10^{-10}
37	1/22	-3.47×10^{-11}	5.25×10^{-11}	1.54×10^{-10}

Table 4-4. Summary of gross alpha and gross beta in air effluent samples from monitored emission points at Building 251, 1997 (continued).

Sampler no.	No. >MDC[(a)]/ Total samples	Minimum (Bq/mL)	Median (Bq/mL)	Maximum (Bq/mL)
Gross alpha				
38	1/22	-1.49×10^{-11}	1.29×10^{-11}	1.08×10^{-10}
39	6/22	-5.00×10^{-12}	2.49×10^{-11}	1.65×10^{-10}
40	3/22	-1.64×10^{-11}	2.65×10^{-11}	1.01×10^{-10}
41	0/22	-3.89×10^{-11}	3.10×10^{-11}	1.03×10^{-10}
42	1/22	-8.88×10^{-12}	1.98×10^{-11}	1.04×10^{-10}
43	0/22	-1.57×10^{-11}	1.20×10^{-11}	3.74×10^{-11}
44	2/22	-2.93×10^{-11}	3.35×10^{-11}	2.63×10^{-10}
45	0/22	-9.58×10^{-12}	3.96×10^{-11}	1.36×10^{-10}
46	6/22	2.33×10^{-11}	4.87×10^{-11}	1.55×10^{-10}
47	5/22	-1.13×10^{-11}	4.57×10^{-11}	1.18×10^{-10}
48	6/22	-1.64×10^{-11}	5.33×10^{-11}	1.62×10^{-10}
49	5/22	-2.38×10^{-12}	5.86×10^{-11}	1.44×10^{-10}
Gross beta				
1	5/22	-3.77×10^{-11}	2.88×10^{-10}	1.31×10^{-9}
2	22/22	1.47×10^{-10}	4.55×10^{-10}	7.99×10^{-10}
3	5/22	-5.03×10^{-11}	1.30×10^{-10}	3.17×10^{-10}
4	22/22	2.81×10^{-10}	5.22×10^{-10}	8.58×10^{-10}
5	7/22	1.98×10^{-10}	8.64×10^{-10}	3.66×10^{-9}
6	3/22	4.26×10^{-12}	3.54×10^{-10}	8.21×10^{-10}
7	8/22	7.62×10^{-11}	2.45×10^{-10}	1.10×10^{-9}
8	3/22	7.36×10^{-11}	1.53×10^{-9}	3.70×10^{-9}
10	15/22	1.16×10^{-10}	6.68×10^{-10}	1.59×10^{-9}
11	4/22	-1.49×10^{-10}	1.08×10^{-9}	4.03×10^{-9}
12	4/22	1.73×10^{-11}	6.97×10^{-11}	6.85×10^{-10}
13	4/22	3.68×10^{-11}	1.40×10^{-10}	4.70×10^{-10}
14	13/22	6.44×10^{-11}	3.89×10^{-10}	6.33×10^{-10}
15	8/22	-5.14×10^{-11}	1.74×10^{-9}	5.85×10^{-9}
16	8/22	2.78×10^{-12}	3.17×10^{-10}	1.58×10^{-9}
17	9/22	-7.55×10^{-12}	1.80×10^{-10}	4.07×10^{-10}
18	4/22	4.40×10^{-12}	8.14×10^{-11}	2.35×10^{-10}
19	3/22	-6.92×10^{-10}	1.20×10^{-9}	3.38×10^{-9}
20	9/22	3.85×10^{-11}	7.49×10^{-11}	2.61×10^{-9}
21	18/22	1.28×10^{-10}	5.83×10^{-10}	2.74×10^{-9}
22	12/22	9.92×10^{-12}	1.12×10^{-10}	3.96×10^{-10}

Table 4–4. Summary of gross alpha and gross beta in air effluent samples from monitored emission points at Building 251, 1997 (concluded).

Sampler no.	No. >MDC[a]/ Total samples	Minimum (Bq/mL)	Median (Bq/mL)	Maximum (Bq/mL)
Gross beta				
23	9/22	9.69×10^{-11}	1.75×10^{-9}	1.10×10^{-8}
24	1/22	-5.14×10^{-11}	1.56×10^{-10}	2.02×10^{-9}
25	1/22	2.07×10^{-12}	1.39×10^{-10}	3.77×10^{-10}
26	2/22	-8.62×10^{-11}	1.53×10^{-10}	9.81×10^{-10}
27	2/22	-1.15×10^{-11}	1.34×10^{-10}	1.30×10^{-9}
28	11/22	1.80×10^{-12}	3.49×10^{-10}	7.10×10^{-10}
29	3/22	1.49×10^{-11}	1.21×10^{-10}	4.14×10^{-10}
30	8/22	-1.06×10^{-10}	1.64×10^{-10}	8.36×10^{-10}
31	5/22	-1.63×10^{-10}	1.29×10^{-9}	4.74×10^{-9}
32	1/22	1.89×10^{-12}	1.27×10^{-10}	6.77×10^{-10}
33	20/22	1.28×10^{-10}	3.56×10^{-10}	7.55×10^{-10}
34	11/22	3.33×10^{-11}	2.13×10^{-10}	8.84×10^{-10}
35	7/22	-1.11×10^{-11}	1.51×10^{-10}	4.55×10^{-10}
36	22/22	8.99×10^{-10}	1.94×10^{-9}	3.49×10^{-9}
37	15/22	1.08×10^{-10}	3.21×10^{-10}	9.95×10^{-10}
38	4/22	7.33×10^{-12}	6.83×10^{-11}	2.11×10^{-10}
39	17/22	2.02×10^{-11}	1.21×10^{-10}	9.07×10^{-10}
40	5/22	-6.14×10^{-12}	7.71×10^{-11}	2.76×10^{-10}
41	2/22	-7.10×10^{-12}	1.55×10^{-10}	6.36×10^{-10}
42	9/22	1.18×10^{-11}	7.64×10^{-11}	4.66×10^{-10}
43	4/22	7.55×10^{-12}	6.14×10^{-11}	1.82×10^{-10}
44	17/22	9.55×10^{-11}	3.08×10^{-10}	5.96×10^{-10}
45	8/22	4.29×10^{-12}	1.81×10^{-10}	5.29×10^{-10}
46	21/22	1.20×10^{-10}	4.63×10^{-10}	1.12×10^{-9}
47	18/22	8.18×10^{-11}	3.61×10^{-10}	8.70×10^{-10}
48	15/22	3.53×10^{-11}	3.60×10^{-10}	9.47×10^{-10}
49	11/22	1.77×10^{-11}	2.11×10^{-10}	7.77×10^{-10}

[a] Minimum detectable concentration.

Table 4-5. Summary of tritium in air effluent samples from monitored emission points at Building 331, 1997.

Sampler no.	No. >MDC[a]/ Total samples	Minimum (Bq/mL)	Median (Bq/mL)	Maximum (Bq/mL)
HT				
Stack 1	44/44	1.21×10^{-5}	1.14×10^{-4}	9.84×10^{-4}
Stack 2	47/47	6.73×10^{-6}	1.51×10^{-3}	5.66×10^{-2}
HTO				
Stack 1	48/48	1.76×10^{-4}	1.82×10^{-3}	7.40×10^{-3}
Stack 2	47/47	1.14×10^{-3}	2.50×10^{-2}	1.08×10^{-1}

[a] Minimum detectable concentration.

Table 4-6. Summary of gross alpha and gross beta in air effluent samples from monitored emission points at Building 332, 1997.

Sampler no.	No. >MDC[a]/ Total samples	Minimum (Bq/mL)	Median (Bq/mL)	Maximum (Bq/mL)
Gross alpha				
SP-1A	0/52	-5.00×10^{-11}	2.85×10^{-12}	6.55×10^{-11}
SP-1B	0/52	-5.37×10^{-11}	1.30×10^{-11}	8.92×10^{-11}
SP-2A	0/52	-4.81×10^{-11}	-2.41×10^{-12}	6.70×10^{-11}
SP-2B	0/52	-2.29×10^{-11}	1.27×10^{-11}	9.25×10^{-11}
SP-3	0/52	-6.40×10^{-11}	-2.53×10^{-12}	6.55×10^{-11}
SP-4	0/52	-4.59×10^{-11}	1.39×10^{-11}	1.08×10^{-10}
SP-5	0/52	-2.80×10^{-11}	-1.03×10^{-11}	8.81×10^{-11}
SP-6A	0/52	-2.83×10^{-11}	1.01×10^{-11}	8.70×10^{-11}
SP-6B	0/52	-5.55×10^{-11}	-1.11×10^{-11}	8.10×10^{-11}
SP-7A	0/52	-4.88×10^{-11}	-1.09×10^{-11}	8.81×10^{-11}
SP-7B	0/52	-3.37×10^{-11}	-1.09×10^{-11}	5.81×10^{-11}
SP-8	0/52	-5.03×10^{-11}	5.76×10^{-12}	6.51×10^{-11}
SP-9	0/52	-2.82×10^{-11}	-3.06×10^{-12}	9.03×10^{-11}
SP-10	0/52	-9.40×10^{-11}	-2.29×10^{-11}	1.08×10^{-10}
SP-11	0/52	-2.29×10^{-11}	1.27×10^{-11}	1.12×10^{-10}
SP-12	0/52	-7.03×10^{-11}	1.17×10^{-11}	1.31×10^{-10}
Gross beta				
SP-1A	1/52	-1.04×10^{-10}	3.06×10^{-11}	2.51×10^{-10}
SP-1B	1/52	-1.21×10^{-10}	3.73×10^{-11}	2.55×10^{-10}
SP-2A	2/52	-1.02×10^{-10}	2.36×10^{-11}	3.19×10^{-10}
SP-2B	0/52	-1.62×10^{-10}	2.71×10^{-11}	2.16×10^{-10}
SP-3	1/52	-8.33×10^{-11}	5.01×10^{-11}	5.37×10^{-10}
SP-4	6/52	-8.10×10^{-11}	7.59×10^{-11}	4.26×10^{-10}
SP-5	0/52	-1.54×10^{-10}	2.28×10^{-11}	2.59×10^{-10}
SP-6A	0/52	-1.35×10^{-10}	3.71×10^{-11}	2.36×10^{-10}
SP-6B	0/52	-1.21×10^{-10}	1.22×10^{-11}	1.42×10^{-10}
SP-7A	2/52	-1.41×10^{-10}	2.38×10^{-11}	3.61×10^{-10}
SP-7B	1/52	-1.03×10^{-10}	3.96×10^{-12}	3.81×10^{-10}
SP-8	1/52	-1.22×10^{-10}	2.07×10^{-11}	2.70×10^{-10}
SP-9	1/52	-1.15×10^{-10}	3.05×10^{-11}	2.88×10^{-10}
SP-10	2/52	-2.36×10^{-10}	6.11×10^{-11}	1.53×10^{-9}
SP-11	5/52	-1.41×10^{-10}	1.81×10^{-11}	3.37×10^{-9}
SP-12	1/52	-2.46×10^{-10}	6.48×10^{-11}	7.25×10^{-10}

a Minimum detectable concentration.

Table 4-7. Summary of gross alpha and gross beta in air effluent samples from monitored emission points at Building 419, 1997.

Sampler no.	No. >MDC[a]/ Total samples	Minimum (Bq/mL)	Median (Bq/mL)	Maximum (Bq/mL)
Gross alpha				
1	0/10	-8.40×10^{-12}	1.09×10^{-11}	1.28×10^{-10}
2	1/10	-9.18×10^{-12}	4.35×10^{-12}	7.81×10^{-10}
Gross beta				
1	2/10	1.23×10^{-11}	7.83×10^{-11}	2.86×10^{-10}
2	1/10	-5.51×10^{-11}	4.29×10^{-11}	1.58×10^{-9}

a Minimum detectable concentration.

Table 4-8. Summary of gross alpha and gross beta in air effluent samples from monitored emission points at Building 490, 1997.

Sampler no.	No. >MDC[a]/ Total samples	Minimum (Bq/mL)	Median (Bq/mL)	Maximum (Bq/mL)
Gross alpha				
1	0/21	-1.90×10^{-11}	7.73×10^{-12}	3.60×10^{-11}
2	0/31	-1.73×10^{-11}	9.10×10^{-13}	6.25×10^{-11}
3	0/21	-6.66×10^{-12}	7.77×10^{-12}	5.55×10^{-11}
4	0/31	-1.71×10^{-11}	7.70×10^{-12}	4.88×10^{-11}
Gross beta				
1	2/21	-5.88×10^{-11}	1.28×10^{-11}	4.22×10^{-10}
2	2/31	-6.18×10^{-11}	2.59×10^{-11}	5.92×10^{-10}
3	2/21	-1.90×10^{-11}	3.40×10^{-11}	5.37×10^{-10}
4	2/31	-6.33×10^{-11}	2.59×10^{-11}	2.26×10^{-10}

a Minimum detectable concentration.

Table 4-9. Summary of gross alpha and gross beta in air effluent samples from monitored emission points at Building 491, 1997.

Sampler no.	No. >MDC[a]/ Total samples	Minimum (Bq/mL)	Median (Bq/mL)	Maximum (Bq/mL)
Gross alpha				
1	1/52	-1.26×10^{-11}	7.40×10^{-12}	7.73×10^{-11}
Gross beta				
1	3/52	-6.66×10^{-11}	3.33×10^{-11}	1.18×10^{-9}

a Minimum detectable concentration.

5

Air Monitoring

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Air Surveillance Sampling Methods

Air surveillance sampling is conducted in seven different networks, each one representing a general location and type of analysis. There are separate networks for sampling radiological particulates and beryllium particulates at both the Livermore site and Site 300, a low-volume radiological network, and a tritium sampling network in Livermore. Four different collection media are employed: glass fibers for radiological particulates, cellulose for beryllium, Millipore AW-19 for low-volume radiological particulates, and silica gel for tritium. Table 5-1 in the main volume shows the organization of the networks, and sampling locations are shown in Figures 5-1, 5-2, and 5-3 in the main volume.

All air samplers are positioned to ensure reasonable probability that any significant concentration of particulate effluents from LLNL operations will be detected. The geographical details of the particulate sampling locations are outlined in a procedure in the Appendix A of *the Environmental Monitoring Plan* (Tate et al. 1998).

Four of the air particulate networks utilize high-volume (hi-vol) air-sampling units, which collect airborne particles on filters. In January 1997, all air particulate hi-vols were upgraded with several new features such as brushless motors, elapsed-time meters, and flow totalizers. These improvements dramatically reduced the loss of samples due to mechanical or power failures. The flow totalizers allowed a more accurate determination of the total volume of air passing through the filter.

If a hi-vol fails or the measured flow rate differs more than 10% from the expected flow rate, it is bench tested using a calibration source traceable to the National Institute for Standards and Technology (NIST). During operation, the flow rate is maintained within 10% (better than the DOE requirement of ±20%) of the nominal flow by using a mass flow controller that adjusts motor speed. All air particulate filters are changed each week at all locations.

After each particulate filter is removed from a sampler, it is identified by location, date on, date off, elapsed time, and flow rate and is given a sample identifier (a four-field code) that accompanies it throughout the analysis. Filters are then placed in glassine envelopes, and the sample information is recorded in a field tracking notebook. All air filters are processed at the end of each month according to their location and required analysis.

Radiological high-vol samplers collect particulate at a continuous rate of 35 CFM using glass fiber filters. The low-volume samplers collect particulate at a continuous rate of 1 CFM using Millipore AW-19 filters. Beryllium samplers collect particulate at a continuous rate of 15 CFM using Whatman 41 cellulose filters. Tritium samplers use a continuous vacuum pump to capture air moisture on silica gel at a flow rate of 700 cubic centimeters per minute.

The details of air particulate sampling and sample change-out are described in Appendix A of the *Environmental Monitoring Plan* (Tate et al. 1995). Details of high-volume sampler flow calibration are also discussed in a procedure (ORAD EMP-AP-CA), and details of air sample analysis procedures are outlined in Hall and Edwards (1994a, b, and c).

Air Particulate Radiological Networks

In March 1997, the filter media for hi-vol radiological air monitoring was changed from cellulose to glass fiber because of glass fiber's excellent collection efficiency of 99.7% or greater (Pate 1962). A total volume of approximately 10 ML of air is sampled at each location each week for radiological analysis. The mass flow totalizers are verified weekly using a portable field unit.

Also during 1997, several changes were made to the radiological air particulate network. The downwind location at ALTA was removed at the request of the landowner. A replacement location was selected; however, because of weather conditions, contract negotiations, and permit conflicts, sample collection at this location did not begin until March of 1998. The upwind sampler at RRCH was also removed at the request of the landowner. A replacement location identified as CHUR (approximately two miles south) was selected and sample collection began in May 1997. One location (LIN) at Site 300 was eliminated in December of 1996 because of off-road access problems. A new location identified as PRIM was added in January 1997 to the Site 300 off-site air particulate networks. PRIM is located approximately two miles from Site 300 and serves as the location for the SWMEI for NESHAPs reporting purposes.

A technical assessment of the sampling network in 1997 evaluated the effectiveness of each site at the current location. As a result of the assessment, three sites (VIS, HOSP, and FCC) were moved in order to reduce or eliminate building and or tree wake effects.

Data from each of the networks are grouped in categories representing the following areas: perimeter, upwind, downwind, diffuse source, and special interest locations.

The LLNL hi-vol radiological air particulate site perimeter network maintains six samplers at the perimeter (CAFE, COW, MESQ, MET, SALV, and VIS), two at diffuse source areas (B531 and CRED) and one at an area of special interest (LWRP); the Livermore Valley network consists of five locations in the least prevalent wind directions (FCC, FIRE, HOSP, RRCH, and CHUR) considered to be upwind or background and four samplers located in the most prevalent downwind directions (PATT, ZON7, TANK, and ALTA). An additional sampler is located in an area of special interest at Livermore Water Reclamation Plant (LWRP) because of a plutonium release to sewer in 1967 that resulted in local soil contamination (see Results section in Chapter 5 of the main volume). The low-volume radiological air particulate network consists of two samplers located at HOSP and FCC.

The perimeter at Site 300 is monitored at seven locations (801E, ECP, EOBS, GOLF, NPS, WCP, and WOBS). In addition to the new site at PRIM, one special interest sampler is monitored in downtown Tracy at TFIR.

Glass fiber filters are collected from the field and placed in glassine bags. The glassine bags are gathered at the end of the month and each filter is cut up to supply samples for the various analyses. Portions of all glass fiber filters (except B531 and CRED) are sent in for gross alpha and gross beta analysis. These samples are sent to the analytical laboratory after a four-day delay to allow for decay of radon–thoron daughters. Gross alpha and gross beta activities are determined using a gas flow proportional counter.

The analytical laboratory uses ^{241}Am and ^{137}Cs as calibration sources to determine alpha and beta counting efficiencies, respectively. Cross-checks using ^{230}Th and ^{90}Sr are also completed periodically. These standards are certified by the Environmental Protection Agency (EPA). Counting-efficiency measurements are made for each set of counted filters. A background count is taken at the beginning of each run and between each set of 20 samples. Records are kept of background and counting-efficiency variations that occur in the counting equipment. The analytical laboratory reports the actual instrumentation values, including negative results, that arise when background measurements are higher than those for the filters. Weekly gross alpha and gross beta results are reported for each location.

As outlined in the Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance (U.S. Department of Energy 1991), gross alpha and gross beta air filter results are used only as trend indicators; specific radionuclide analysis is done for plutonium, uranium, and all gamma emitters. All analytical results are reported as a measured concentration per volume of air, or at the minimum detection limit (MDL) when no activity is detected. In all cases, the MDL is more than adequate for demonstrating compliance with the pertinent regulatory requirements for radionuclides that are present or may be present in the air sampled. Particle size distributions are not determined because the estimated effective dose equivalent to the maximally exposed individual is well below the 0.01 mSv (1 mrem) allowable limit (U.S. Department of Energy 1991).

For gamma scanning, six separate composites are created using another portion of all weekly glass fiber filters from each Livermore perimeter location. These composited filters are placed into clear bags representing each of the Livermore perimeter locations (SALV, MESQ, CAFE, MET, VIS, and COW) for the month. Each monthly composite is placed into a 214-cm^3 aluminum can and counted for gamma-emitting radionuclides using a low-background Ge(Li) detector.

Following gamma counting, the composited glass fiber filters from each Livermore site perimeter location are analyzed for the presence of ^{239}Pu, ^{235}U, and ^{238}U by LLNL's Chemistry and Materials Science Environmental Services Laboratory. The filters are ashed and then dissolved in a mixture of nitric acid and hydrochloric and/or hydrofluoric acids. Plutonium and uranium are separated by an ion-exchange process. Each separated element is purified further by ion exchange. Then plutonium is electroplated onto a stainless steel disk and analyzed by alpha spectrometry, while uranium solutions are analyzed by mass spectrometry.

The remaining glass fiber portions consisting of all Livermore Valley (ALTA, PATT, TANK, ZON7, FCC, FIRE, HOSP, RRCH, CHUR) and Site 300 off site (PRIM and TFIR) are composited by location and analyzed for ^{239}Pu as described above.

One composite is created using portions of all S300 perimeter locations (801E, ECP, EOBS, GOLF, NPS, WCP, and WOBS). This composite is gamma scanned and its entire contents analyzed for ^{239}Pu, ^{235}U, and ^{238}U.

Replicate radiological Quality Assurance (QA) samples are processed to confirm the precision of the analytical results obtained from the samplers. A duplicate QA sampler is operated for two months in parallel with the permanent sampler at a given site. In addition, a trip blank is collected during each route. The QA filters also are exchanged weekly, and both filter sets are submitted for analysis in the usual manner. After two months, the QA sampler is rotated to another location. The QA trip blanks and QA duplicates are processed in the same manner as the routine samples and analyzed for the same radiological parameters.

Air Particulate Beryllium

Beryllium analysis requires an easily dissolvable filter with a low trace-metal background. Whatman-41 filters provide a balance between such requirements and particulate collection efficiency (Lindeken et al. 1963).

Beryllium is monitored at all Livermore perimeter locations (SALV, MESQ, CAFE, VIS, MET, and COW) as required by the Bay Area Air Quality Management District. Although there is no requirement to monitor beryllium at Site 300, it is monitored at four locations (801E, EOBS, GOLF, and TFIR). In 1996, an assessment of Site 300 beryllium network determined that a reduction in the total number of locations could still provide adequate data for determining the ambient beryllium concentrations. As a result of this assessment, five perimeter sites historically analyzed for beryllium (ECP, WCP, GOLF, LIN, and WOBS) were eliminated.

A total volume of approximately 4.3 ML of air is sampled at each location each week for beryllium analysis. The details of air particulate sampling and sample change-out are described in Appendix A of the *Environmental Monitoring Plan* (Tate et al. 1995). Details of high-volume sampler flow calibration are also discussed in a procedure (ORAD EMP-AP-CA).

The cellulose filters from each site are halved with one portion saved on site for archival purposes and the other composited into a monthly sample (one for each location) and sent out to the analytical labs for analysis. The off-site analytical laboratory adds 40 mL of 10% nitric acid to each composite and digests the mixture for 30 minutes. The nitric acid supernatant is decanted into a separate beaker where more nitric acid is added. This step is repeated two more times and the resulting solution is evaporated to less than 20 mL (care is taken to prevent the samples from boiling or baking dry). The samples are diluted to 20 mL with deionized water. The quantity of beryllium is determined by graphite furnace atomic absorption spectroscopy.

Trip blanks are collected weekly from the Site 300 and Livermore networks and split samples are chosen from the archived portions of the routine sample filters. These samples are sent to the analytical laboratory as blind samples to help determine the accuracy of the analytical measurement.

Air Tritium

LLNL also maintains 11 continuously operating airborne tritium samplers on the Livermore site (main volume, Figure 5-1), five samplers in the Livermore Valley (main volume, Figure 5-2), and near Site 300 (main volume, Figure 5-3). Four of the Livermore site locations (B331, B292, B514, and B624) monitor diffuse source emissions. The tritium sample locations are detailed in Appendix B of the *Environmental Monitoring Plan* (Tate et al. 1995). The tritium samplers, operating at a flow rate of 700 mL / min, use silica gel in flasks to collect water vapor. These flasks are changed every two weeks, and the samples are identified by location, date on, date off, elapsed sampling time, and flow rate. The flow rate is the average of the initial and final flow rates, which are measured biweekly with a rotameter that is calibrated once a year. Each sample is given a sample identifier that accompanies it through analysis. Two additional samplers are rotated among the locations at two-month intervals to provide duplicate QA samples. Details of the actual tritium sampling and a description of tritium sampler calibration can be found in Appendix A of the *Environmental Monitoring Plan* (Tate et al. 1995).

Once the samples are taken, the water is separated from the silica gel by freeze-dried vacuum distillation, and the tritium concentration in the water is determined by liquid-scintillation counting. Airborne tritium sample analysis is done by LLNL's Chemistry and Materials Science Environmental Services Laboratory. All analytical results are reported as a measured concentration per unit volume of air flow through the sampling medium. Details of the analytical procedure are described in Hall and Edwards (1994a, b, and c).

Data

Monthly summaries of gross alpha and gross beta data are presented in **Tables 5-1**, **5-2**, and **5-14**. **Tables 5-3** and **5-15** present monthly gamma activity on air filters for the Livermore site perimeter and Site 300. Monthly plutonium data for each sampling location are shown in **Table 5-4**. Monthly uranium data for the Livermore site perimeter and Site 300 are presented in **Tables 5-7** and **5-17**. Biweekly tritium data for sampling locations in the Livermore Valley, Livermore site perimeter, and diffuse sources are shown in **Tables 5-10**, **5-11**, and **5-12**. **Table 5-18** shows tritium-in-air data for Site 300. **Tables 5-13** and **5-19** present monthly beryllium data for Livermore site perimeter and Site 300 sampling locations. The monthly low volume gross alpha and gross beta data for locations HOSP and FCC are presented in **Tables 5-8** and **5-9**.

The data generally reflect historic data values for these analytes at these locations. A detailed discussion of these results is provided in the main volume of this report.

Table 5-1. Median gross alpha and gross beta activities at the LLNL perimeter,[a] summarized by month and location, 1997.

Month	SALV	MESQ	CAFE	MET	VIS	COW
Gross alpha	(10^{-12} Bq/mL)					
Jan	41.9	8.7	46.0	–11.4	14.7	5.7
Feb	7.5	7.2	–9.3	19.4	–0.6	20.0
Mar	–40.0	13.1	–9.3	57.6	83.3	30.2
Apr[b]	22.3	34.6	34.3	16.7	19.2	32.5
May	18.4	42.8	16.1	34.6	18.4	–1.6
Jun	8.2	18.0	–1.6	9.9	15.9	3.0
Jul	16.5	13.4	18.6	35.4	26.7	20.9
Aug	13.6	1.8	36.6	13.1	32.1	20.1
Sep	–21.0	23.2	19.4	–4.9	33.2	–2.9
Oct	–8.2	8.9	–9.4	15.3	–16.4	35.8
Nov	–15.7	13.7	13.0	32.2	30.6	–0.2
Dec	–11.5	–8.0	–0.8	–16.0	–7.7	–15.4
Annual median[c]	**8.8**	**12.5**	**16.1**	**17.3**	**23.4**	**10.8**
IQR[c,d]	**38.8**	**41.4**	**41.3**	**43.0**	**46.9**	**48.0**
Annual maximum[c]	**107.0**	**136.0**	**74.3**	**138.2**	**135.5**	**103.0**
Gross beta						
Jan	218.4	324.2	249.1	271.1	191.2	127.7
Feb	271.6	357.7	354.1	282.8	253.0	218.5
Mar	290.9	270.2	302.5	203.1	319.7	410.0
Apr[b]	471.9	487.0	476.9	519.0	491.2	446.0
May	521.8	484.4	593.4	508.0	429.2	518.6
Jun	410.8	404.7	531.5	429.8	389.9	424.4
Jul	518.2	620.8	579.3	608.1	552.9	570.2
Aug	449.8	613.8	482.7	535.7	586.6	573.1
Sep	673.6	624.1	606.8	707.3	691.0	732.5
Oct	1047.1	957.2	1066.9	1226.6	1154.6	1109.0
Nov	513.3	524.6	495.1	537.0	498.2	515.7
Dec	883.8	822.5	848.1	844.9	895.1	822.8
Annual median[c]	**497.9**	**546.2**	**534.7**	**518.4**	**480.7**	**509.9**
IQR[c, d]	**222.5**	**214.0**	**190.0**	**205.4**	**237.3**	**216.8**
Annual maximum[c]	**1471.7**	**1418.9**	**1462.9**	**1448.7**	**1444.9**	**1374.0**

a See Figure 5-1, main volume, for sampling locations.

b Filter media changed from cellulose to glass fiber. Samples from April through December were collected on glass fiber filters.

c As determined by data for the 52-week period.

d Interquartile range.

Table 5-2a. Median gross alpha activities for the Livermore Valley,[(a)] 1997.

Month	Livermore Valley downwind				Special interest
	PATT	ZON7	TANK	ALTA	LWRP
	(10^{-12} Bq/mL)				
Jan	10.4	–0.1	3.0	–5.9	48.2
Feb	0.7	7.3	20.3	19.0	40.0
Mar	0.1	13.5	14.3	27.1	46.3
Apr[(b)]	24.0	16.5	27.4	24.1	48.5
May	36.5	16.6	17.6	—[(d)]	42.5
Jun	15.3	3.8	2.9		13.9
Jul	33.8	33.0	21.2		27.3
Aug	18.6	32.0	18.0		15.1
Sep	–15.0	–15.9	5.8		0.3
Oct	28.4	20.1	45.7		2.1
Nov	4.1	17.6	–5.7		–13.8
Dec	15.7	7.6	18.4		6.3
Annual median[(e)]	**15.3**	**14.8**	**18.0**	**14.8**	**22.1**
IQR[(e,f)]	**42.3**	**28.2**	**36.4**	**36.2**	**41.4**
Annual maximum[(e)]	**101.8**	**71.2**	**96.9**	**106.0**	**78.6**

Table 5-2a. Median gross alpha activities for the Livermore Valley,[a] 1997 (concluded).

Month	Livermore Valley upwind				
	CHUR	FCC	FIRE	HOSP	RRCH
	(10^{-12} Bq/mL)				
Jan		–12.6	13.1	46.3	31.2
Feb		53.7	0.3	24.7	36.4
Mar		23.2	42.0	25.8	10.4
Apr[b]	—[c]	44.9	13.8	14.4	5.6
May	21.3	23.4	21.9	16.0	36.0
Jun	0.5	3.3	0.2	–1.7	—[d]
Jul	29.3	12.7	24.5	29.8	
Aug	3.0	31.5	25.6	17.5	
Sep	–14.0	–3.1	–3.0	22.9	
Oct	20.3	5.4	–8.2	21.8	
Nov	–2.6	18.1	–4.5	–11.8	
Dec	1.5	–37.0	8.9	–20.3	
Annual median[e]	**3.9**	**13.8**	**10.0**	**15.2**	**27.5**
IQR[e,f]	**27.9**	**39.4**	**38.9**	**41.2**	**42.0**
Annual maximum[e]	**54.4**	**155.1**	**83.5**	**87.8**	**122.0**

a See Figure 5-2, main volume, for sampling locations.

b Filter medium changed from cellulose to glass fiber. Samples from April through December were collected on glass fiber filters.

c Sampling site added.

d Sampling site removed.

e Determined by data for the 52-week period.

f Interquartile range.

Table 5-2b. Median gross beta activities for the Livermore Valley,[a] 1997.

Month	Livermore Valley downwind				Special interest
	PATT	ZON7	TANK	ALTA	LWRP
	(10^{-12} Bq/mL)				
Jan	186.3	202.8	393.6	274.8	254.1
Feb	267.4	360.3	276.1	342.2	256.7
Mar	249.9	265.2	308.6	346.1	451.4
Apr[b]	488.0	512.5	481.2	529.5	501.9
May	633.0	551.5	563.8	—[d]	477.6
Jun	417.6	410.7	468.1		405.6
Jul	642.0	549.5	594.0		527.0
Aug	466.9	499.2	525.5		507.3
Sep	770.3	697.0	622.7		784.7
Oct	872.6	927.3	961.4		1075.6
Nov	502.8	630.7	459.5		666.5
Dec	736.2	977.4	806.3		907.4
Annual median[e]	**468.9**	**500.7**	**506.8**	**380.9**	**511.9**
IQR[e,f]	**300.7**	**247.9**	**177.8**	**245.2**	**262.5**
Annual maximum[e]	**1350.6**	**1709.9**	**1342.6**	**699.4**	**1571.6**

Table 5-2b. Median gross alpha activities for the Livermore Valley,[a] 1997 (concluded).

Month	Livermore Valley upwind				
	CHUR	FCC	FIRE	HOSP	RRCH
	(10^{-12} Bq/mL)				
Jan		300.3	227.2	208.1	313.9
Feb		249.9	289.0	212.4	313.7
Mar		332.7	322.6	256.6	261.2
Apr[b]	—[c]	495.8	398.9	474.6	452.6
May	593.7	592.6	554.3	547.0	561.5
Jun	467.1	394.7	379.2	431.8	—[d]
Jul	630.9	668.6	543.7	598.3	
Aug	546.1	521.8	414.8	498.5	
Sep	700.1	687.1	660.8	724.1	
Oct	1322.9	907.2	939.2	917.1	
Nov	564.1	584.8	585.1	523.8	
Dec	942.4	983.4	757.6	838.1	
Annual median[e]	**581.8**	**526.3**	**498.2**	**503.6**	**416.9**
IQR[e,f]	**242.8**	**249.2**	**240.5**	**233.9**	**213.6**
Annual maximum[e]	**1552.9**	**1424.7**	**1295.8**	**1341.8**	**622.8**

a See Figure 5-2, main volume, for sampling locations.

b Filter medium changed from cellulose to glass fiber. Samples from April through December were collected on glass fiber filters.

c Sampling site added.

d Sampling site removed.

e Determined by data for the 52-week period.

f Interquartile range.

Table 5-3. Gamma activity in particulate air samples, Livermore site perimeter,[(a)] 1997.

Month	^{7}Be	^{40}K	^{137}Cs	^{22}Na	^{226}Ra	^{228}Ra	^{228}Th
	(10^{-9} Bq/mL)	(10^{-12} Bq/mL)					
Jan	2.9 ± 0.05	<5.1	<0.2	<0.2	<0.4	<0.80	<0.49
Feb	3.3 ± 0.05	<4.9	<0.2	<0.2	<0.4	<0.79	<0.40
Mar	5.7 ± 0.11	<5.7	<0.2	<0.2	<0.4	2.4 ± 1.4	1.0 ± 0.8
Apr[(b)]	3.1 ± 0.07	–8.0 ± 15.4	<0.2	0.7 ± 0.6	<4.3	<1.3	<0.49
May	4.0 ± 0.09	24.2 ± 11.1	<0.1	0.4 ± 0.3	<3.3	<1.0	1.2 ± 0.6
Jun	2.9 ± 0.06	24.0 ± 18.1	<0.2	<0.2	<6.5	1.9 ± 1.8	1.4 ± 1.2
Jul	3.4 ± 0.05	60.9 ± 14.2	<0.1	<0.2	<4.0	2.1 ± 1.5	1.8 ± 0.8
Aug	2.7 ± 0.04	18.6 ± 14.8	<0.1	<0.2	<4.9	<0.7	0.69 ± 0.66
Sep	6.5 ± 0.14	62.4 ± 20.8	<0.2	<0.3	<7.0	4.1 ± 2.2	3.3 ± 1.5
Oct	4.3 ± 0.07	22.1 ± 16.3	<0.2	<0.3	<0.6	2.7 ± 1.7	1.4 ± 0.9
Nov	3.2 ± 0.06	44.0 ± 32.2	<0.3	<0.4	<1.0	3.0 ± 2.9	<1.1
Dec	3.4 ± 0.06	52.5 ± 18.6	<0.2	<0.2	<7.1	<1.8	<1.0
Median	**3.4**	**23.0**	**<0.2**	**<0.3**	**<3.7**	**1.9**	**<1.1**
IQR[(c)]	**1.0**	—[(d)]	—[(d)]	—[(d)]	—[(d)]	**1.5**	—[(d)]
Maximum	**6.5**	**62.4**	**<0.3**	**0.7**	**<7.1**	**4.1**	**3.3**
DCG[(e)]	1.5×10^{-3}	3.3×10^{-5}	1.5×10^{-5}	3.7×10^{-5}	3.7×10^{-8}	1.1×10^{-7}	1.5×10^{-9}
Median fraction of DCG	2.2×10^{-6}	7.0×10^{-7}	$<1.2 \times 10^{-8}$	$<6.6 \times 10^{-9}$	$<1.0 \times 10^{-4}$	1.7×10^{-5}	$<7.1 \times 10^{-4}$
	(μCi/mL)						
Median	9.1×10^{-14}	6.2×10^{-15}	$<5.0 \times 10^{-18}$	$<6.6 \times 10^{-18}$	$<1.0 \times 10^{-16}$	5.0×10^{-17}	$<2.9 \times 10^{-16}$
IQR[(c)]	2.8×10^{-14}	—[(d)]	—[(d)]	—[(d)]	—[(d)]	4.1×10^{-17}	—[(d)]
Maximum	1.8×10^{-13}	7.1×10^{-15}	$<9.1 \times 10^{-18}$	1.9×10^{-17}	$<1.9 \times 10^{-16}$	1.1×10^{-16}	8.8×10^{-17}
DCG[(e)]	4.0×10^{-8}	9.0×10^{-10}	4.0×10^{-10}	1.0×10^{-9}	1.0×10^{-12}	3.0×10^{-12}	4.0×10^{-14}

Note: Radionuclide results are reported ±2σ. See Chapter 13, Quality Assurance.

[a] All Livermore site perimeter samples composited. See Figure 5-1, main volume, for sampling locations.

[b] Filter media changed from cellulose to glass fiber filter. Samples from April through December were collected on glass fiber filters.

[c] Interquartile range.

[d] No IQR calculated; see Chapter 13, Quality Assurance.

[e] Derived Concentration Guide (DOE Order 5400.5). See Chapter 12, Radiation Dose Assessment.

Table 5-4. Plutonium activity in air particulate samples, Livermore Valley,[a] 1997.

Month	Livermore Valley downwind				Special interest
	ALTA	PATT	TANK	ZON7	LWRP
	(10^{-15} Bq/mL)				
Jan	4.5 ± 9.6	–7.0 ± 8.1	9.9 ± 16.1	2.6 ± 11.1	2.9 ± 12.2
Feb	–4.3 ± 6.0	–6.2 ± 17.4	–2.0 ± 25.8	–7.8 ± 21.2	11.5 ± 15.1
Mar	0.2 ± 11.5	–1.0 ± 12.1	8.7 ± 14.5	1.9 ± 13.4	5.9 ± 30.0
Apr[b]	4.7 ± 8.8	1.7 ± 4.9	1.0 ± 7.2	1.0 ± 5.8	11.7 ± 10.0
May	—[c]	–9.7 ± 21.0	–4.0 ± 5.3	6.4 ± 7.3	21.6 ± 12.2
Jun		1.2 ± 5.1	–1.4 ± 1.9	2.7 ± 10.9	12.1 ± 16.0
Jul		–0.1 ± 4.5	0.2 ± 3.2	–1.1 ± 6.2	9.4 ± 14.9
Aug		1.0 ± 3.0	–2.0 ± 6.4	1.2 ± 6.5	23.9 ± 9.2
Sep		5.7 ± 6.8	0.2 ± 7.3	11.5 ± 11.3	4.4 ± 5.8
Oct		3.4 ± 6.3	–3.6 ± 7.2	12.2 ± 9.1	15.2 ± 10.2
Nov		6.6 ± 9.5	–3.4 ± 6.8	–2.7 ± 7.4	3.2 ± 5.4
Dec		–2.4 ± 4.5	1.0 ± 4.1	3.1 ± 4.8	2.2 ± 5.1
Median	**2.4**	**0.5**	**–0.6**	**2.3**	**10.5**
IQR[d]	**5.4**	**5.4**	**3.4**	**3.4**	**8.8**
Fraction of DCG[e]	**3.2×10^{-6}**	**6.3×10^{-7}**	**—[f]**	**3.1×10^{-6}**	**1.4×10^{-5}**
	(µCi/mL)				
Median	**6.4×10^{-20}**	**1.3×10^{-20}**	**-1.5×10^{-20}**	**6.1×10^{-20}**	**2.8×10^{-19}**
IQR[d]	**1.5×10^{-19}**	**1.5×10^{-19}**	**9.1×10^{-20}**	**9.2×10^{-19}**	**2.4×10^{-19}**

Table 5-4. Plutonium activity in air particulate samples, Livermore Valley,[a] 1997. (concluded).

Month	Livermore Valley upwind				
	FCC	FIRE	HOSP	RRCH	CHUR
	(10^{-15} Bq/mL)				
Jan	–5.8 ± 10.4	5.7 ± 13.5	–1.9 ± 15.8	–6.1 ± 9.5	
Feb	–32.0 ± 28.1	–9.8 ± 11.7	–0.9 ± 8.7	–12.6 ± 18.4	
Mar	–10.3 ± 12.5	–4.0 ± 15.2	9.1 ± 12.0	–2.8 ± 3.9	
Apr[b]	0.7 ± 5.7	–4.5 ± 6.0	–1.0 ± 5.9	7.4 ± 8.5	—[g]
May	8.9 ± 11.4	3.2 ± 5.4	3.8 ± 7.8	–2.5 ± 5.4	–4.9 ± 5.7
Jun	–1.6 ± 9.1	2.7 ± 11.2	3.4 ± 10.2	—[c]	–1.2 ± 6.5
Jul	0.5 ± 9.9	7.6 ± 10.7	2.4 ± 7.3		6.6 ± 9.6
Aug	1.2 ± 4.9	8.1 ± 5.4	2.1 ± 4.1		4.6 ± 4.8
Sep	1.0 ± 5.8	6.8 ± 6.1	13.1 ± 14.2		8.3 ± 7.2
Oct	0.7 ± 4.6	5.3 ± 4.7	—[h]		14.7 ± 10.3
Nov	–3.8 ± 4.0	2.2 ± 3.1	–1.9 ± 3.6		4.5 ± 7.0
Dec	–2.7 ± 4.8	–2.8 ± 5.1	–1.8 ± 3.5		0.8 ± 5.6
Median	**–0.5**	**3.0**	**2.1**	**–2.8**	**4.6**
IQR[d]	**5.1**	**9.1**	**5.0**	**3.6**	**6.7**
Fraction of DCG[e]	**—[f]**	**4.0×10^{-6}**	**2.9×10^{-6}**	**—[f]**	**6.2×10^{-6}**
	(µCi/mL)				
Median	**1.4×10^{-20}**	**8.0×10^{-20}**	**5.7×10^{-20}**	**-7.5×10^{-20}**	**1.2×10^{-19}**
IQR[d]	**1.4×10^{-19}**	**2.6×10^{-19}**	**1.4×10^{-19}**	**9.8×10^{-20}**	**1.8×10^{-19}**

Note: Radionuclide results are reported $\pm 2\sigma$. See Chapter 13, Quality Assurance.

a See Figure 5-2, main volume, for sampling locations.

b Filter media changed from cellulose to glass fiber. Samples from April through December were collected on glass fiber filters.

c Sample site removed.

d Interquartile range.

e Derived Concentration Guide (DCG) = 7.4×10^{-10} Bq/mL for ^{239}Pu activity in air (2×10^{-14} µCi/mL).

f Fraction of DCG not determined when median value is negative.

g Sample site added.

h Sample lost during analytical process.

Table 5-5. Plutonium activity in air particulate samples, Livermore site perimeter, 1997.

Month	Sampling location[(a)]					
	CAFE	COW	MESQ	MET	SALV	VIS
	(10^{-15} Bq/mL)					
Jan	–5.2 ± 14.6	10.4 ± 31.4	–9.3 ± 15.9	–0.9 ± 20.1	5.0 ± 15.1	4.1 ± 11.7
Feb	6.0 ± 25.2	–10.4 ± 12.4	8.7 ± 13.8	–1.5 ± 12.5	11.8 ± 12.3	2.3 ± 16.1
Mar	7.1 ± 26.5	1.3 ± 32.0	16.7 ± 25.4	12.2 ± 29.7	–8.3 ± 38.1	–11.5 ± 34.4
Apr[(b)]	4.3 ± 8.4	1.4 ± 11.0	13.5 ± 11.5	7.2 ± 7.1	9.8 ± 8.4	–6.5 ± 12.5
May	14.5 ± 8.4	10.9 ± 8.1	8.8 ± 8.7	6.6 ± 6.5	5.6 ± 6.7	9.1 ± 6.6
Jun	1.4 ± 11.6	11.1 ± 14.9	5.7 ± 9.1	11.5 ± 16.8	1.6 ± 9.7	195.4 ± 41.4
Jul	5.4 ± 10.0	–1.0 ± 7.1	10.6 ± 8.4	6.3 ± 10.0	14.5 ± 11.3	6.9 ± 11.3
Aug	9.5 ± 6.4	4.3 ± 4.9	7.7 ± 5.6	3.3 ± 3.9	11.2 ± 9.2	11.0 ± 7.3
Sep	17.8 ± 9.1	–8.2 ± 41.4	14.5 ± 8.3	7.5 ± 6.9	14.3 ± 8.8	8.4 ± 6.9
Oct	11.4 ± 6.8	8.7 ± 6.6	9.5 ± 7.5	6.8 ± 6.0	48.5 ± 14.5	5.5 ± 6.5
Nov	8.4 ± 6.6	1.6 ± 4.9	0.2 ± 6.5	8.7 ± 6.5	–6.4 ± 8.8	3.6 ± 5.8
Dec	4.5 ± 6.4	8.5 ± 8.6	–0.1 ± 3.9	–0.1 ± 4.0	1.8 ± 5.4	14.6 ± 10.7
Median	**6.5**	**3.0**	**8.8**	**6.7**	**7.7**	**6.2**
IQR[(c)]	**5.6**	**8.4**	**7.0**	**5.3**	**10.7**	**5.3**
Fraction of DCG[(d)]	**8.8×10^{-6}**	**4.0×10^{-6}**	**1.2×10^{-5}**	**9.1×10^{-6}**	**1.0×10^{-5}**	**8.4×10^{-6}**
	(µCi/mL)					
Median	**1.8×10^{-19}**	**8.1×10^{-20}**	**2.4×10^{-19}**	**1.8×10^{-19}**	**2.1×10^{-19}**	**1.7×10^{-19}**
IQR[(c)]	**1.5×10^{-19}**	**2.3×10^{-19}**	**1.9×10^{-19}**	**1.4×10^{-19}**	**2.9×10^{-19}**	**1.4×10^{-19}**

Note: Radionuclide results are reported $\pm 2\sigma$. See Chapter 13, Quality Assurance.

a See Figure 5-1, main volume, for sampling locations.

b Filter media changed from cellulose to glass fiber. Samples from April through December were collected on glass fiber filters.

c Interquartile range.

d Derived Concentration Guide (DCG) = 7.4×10^{-10} Bq/mL for ^{239}Pu activity in air (2×10^{-14} µCi/mL).

Table 5-6. Plutonium activity in air particulate samples, diffuse sources, 1997.

Month	Sampling location[(a)] B531	Sampling location[(a)] CRED
	(10^{-15} Bq/mL)	
Jan	29.5 ± 23.9	7.2 ± 11.1
Feb	9.8 ± 38.9	–0.6 ± 14.7
Mar	17.2 ± 31.2	–4.2 ± 15.9
Apr[(b)]	203.5 ± 34.7	5.8 ± 10.4
May	48.1 ± 18.3	0.9 ± 6.1
Jun	46.6 ± 21.0	–3.6 ± 7.8
Jul	224.2 ± 44.8	7.1 ± 13.3
Aug	63.6 ± 16.7	2.6 ± 3.9
Sep	64.0 ± 18.0	12.4 ± 8.4
Oct	104.0 ± 23.0	5.3 ± 5.3
Nov	7.7 ± 7.8	3.7 ± 6.1
Dec	4.8 ± 6.1	28.6 ± 15.2
Median	**47.4**	**4.5**
IQR[(c)]	**58.7**	**6.6**
Fraction of DCG[(d)]	**6.47×10^{-5}**	**6.0×10^{-6}**
	(µCi/mL)	
Median	**1.3×10^{-18}**	**1.2×10^{-19}**
IQR[(c)]	**1.6×10^{-18}**	**1.8×10^{-19}**

Note: Radionuclide results are reported $\pm 2\sigma$. See Chapter 13, Quality Assurance.

a See Figure 5-1, main volume, for sampling locations.

b Filter media changed from cellulose to glass fiber. Samples from April through December were collected on glass fiber filters.

c Interquartile range.

d Derived Concentration Guide (DCG) = 7.4×10^{-10} Bq/mL for ^{239}Pu activity in air (2×10^{-14} µCi/mL).

Table 5-7. Uranium mass in air particulate samples, Livermore site perimeter, 1997.

Location[a]	Month	Uranium 238 (10^{-5} µg/m^3)	Uranium 235 (10^{-7} µg/m^3)	Uranium 235/238 (10^{-3})
SALV	Jan	2.28	1.11	4.87
	Feb	2.22	1.46	6.58
	Mar	4.11	2.91	7.08
	Apr[b]	5.29	4.09	7.72
	May	6.74	4.77	7.08
	Jun	5.69	3.78	6.64
	Jul	5.13	3.31	6.45
	Aug	1.27	0.88	6.96
	Sep	3.17	1.94	6.12
	Oct	11.9	8.54	7.21
	Nov	1.03	0.12	1.12
	Dec	1.02	0.59	5.78
Median		**3.64**	**2.42**	**6.61**
IQR[c]		**3.41**	**2.81**	**1.05**
Maximum		**11.9**	**8.54**	**NA**
Fraction of DCG[d]		**1.2×10^{-4}**	**5.2×10^{-6}**	**NA**
MESQ	Jan	1.18	0.83	6.96
	Feb	2.44	1.65	6.77
	Mar	4.16	2.99	7.18
	Apr[b]	10.5	7.64	7.25
	May	11.7	8.57	7.34
	Jun	9.55	6.25	6.54
	Jul	12.6	8.23	6.55
	Aug	9.81	7.01	7.15
	Sep	14.6	10.4	7.12
	Oct	13.8	9.94	7.19
	Nov	3.40	2.14	6.27
	Dec	0.54	0.12	2.15
Median		**9.68**	**6.63**	**7.04**
IQR[c]		**8.74**	**6.30**	**0.63**
Maximum		**14.6**	**10.4**	**NA**
Fraction of DCG[d]		**3.2×10^{-4}**	**1.4×10^{-5}**	**NA**

Table 5-7. Uranium mass in air particulate samples, Livermore site perimeter, 1997 (continued).

Location[a]	Month	Uranium 238 (10^{-5} μg/m^3)	Uranium 235 (10^{-7} μg/m^3)	Uranium 235/238 (10^{-3})
CAFE	**Jan**	4.31	2.94	6.83
	Feb	4.43	3.09	6.97
	Mar	4.76	3.34	7.02
	Apr[b]	4.66	3.14	6.73
	May	7.44	5.48	7.36
	Jun	4.95	3.20	6.48
	Jul	6.78	4.05	5.97
	Aug	8.52	6.31	7.40
	Sep	9.77	6.79	6.94
	Oct	13.2	9.56	7.27
	Nov	3.85	2.57	6.68
	Dec	1.52	0.96	6.33
Median		**4.85**	**3.27**	**6.89**
IQR[c]		**3.31**	**2.63**	**0.45**
Maximum		**13.2**	**9.56**	**NA**
Fraction of DCG[d]		**1.6×10^{-4}**	**7.0×10^{-6}**	**NA**
MET	**Jan**	1.83	0.98	5.34
	Feb	2.33	1.63	6.99
	Mar	3.83	2.7	7.04
	Apr[b]	2.05	1.55	7.56
	May	5.66	4.51	7.97
	Jun	3.24	2.35	7.27
	Jul	5.20	3.63	6.98
	Aug	2.68	2.06	7.68
	Sep	6.23	4.39	7.04
	Oct	8.77	6.21	7.08
	Nov	0.65	0.11	1.68
	Dec	1.68	1.21	7.24
Median		**2.96**	**2.21**	**7.06**
IQR[c]		**3.32**	**2.35**	**0.36**
Maximum		**8.77**	**6.21**	**NA**
Fraction of DCG[d]		**9.9×10^{-3}**	**4.7×10^{-5}**	**NA**

Table 5-7. Uranium mass in air particulate samples, Livermore site perimeter, 1997 (concluded).

Location[a]	Month	Uranium 238 (10^{-5} µg/m^3)	Uranium 235 (10^{-7} µg/m^3)	Uranium 235/238 (10^{-3})
VIS	**Jan**	1.59	0.844	5.29
	Feb	1.83	1.33	7.26
	Mar	3.78	2.67	7.07
	Apr[b]	1.16	1.31	11.3
	May	5.48	4.25	7.75
	Jun	0.03	-0.41	—[e]
	Jul	6.09	4.20	6.89
	Aug	3.36	2.37	7.06
	Sep	7.23	5.40	7.46
	Oct	9.40	6.80	7.24
	Nov	2.99	1.84	6.15
	Dec	2.98	1.59	5.33
Median		**3.18**	**2.11**	**7.07**
IQR[c]		**3.87**	**2.89**	**0.84**
Maximum		**9.40**	**6.80**	**NA**
Fraction of DCG[d]		**1.1×10^{-4}**	**4.5×10^{-4}**	**NA**
COW	**Jan**	1.7	0.964	5.67
	Feb	3.19	2.28	7.16
	Mar	4.63	3.31	7.15
	Apr[b]	4.16	3.42	8.22
	May	7.59	5.75	7.58
	Jun	6.28	4.54	7.23
	Jul	6.85	4.59	6.70
	Aug	7.33	4.82	6.57
	Sep	5.14	3.62	7.05
	Oct	16.1	11.6	7.17
	Nov	5.45	3.80	6.97
	Dec	1.81	1.16	6.39
Median		**5.29**	**3.71**	**7.10**
IQR[c]		**3.05**	**1.59**	**0.52**
Maximum		**16.1**	**11.6**	**NA**
Fraction of DCG[d]		**1.8×10^{-4}**	**7.9×10^{-4}**	**NA**

a See Figure 5-1, main volume, for sampling locations.

b Filter media changed from cellulose to glass fiber. Samples from April through December were collected on glass fiber filters.

c Interquartile range.

d Derived Concentration Guide (DCG) = 0.3 µg/m^3 for ^{238}U activity in air; DCG = 0.047 µg/m^3 for ^{235}U activity in air.

e Ratio not determined when the value of one of the masses was negative.

NA = Not applicable.

Table 5-8. Median gross alpha activities from low volume air samplers, 1997.

Month	Livermore Valley upwind HOSP	Livermore Valley upwind FCC
	(10^{-12} Bq/mL)	
Jul[(a)]	100.6	49.2
Aug	89.7	81.4
Sep	328.9	219.4
Oct	728.9	482.5
Nov	305.4	146.9
Dec	210.9	102.9
Annual median[(b)]	**134.5**	**118.0**
IQR[(c)]	**356.2**	**175.8**
Annual maximum[(d)]	**1461.5**	**1406.0**

[a] Sampling started in end of July. Only one sample result for this month.

[b] The annual median is determined from the weekly data for July 23 through December 30.

[c] The interquartile range is determined from the weekly data for July 23 through December 30.

[d] The annual maximum is determined from the weekly data for July 23 through December 30.

Table 5-9. Median gross beta activities from low volume air samplers, 1997.

Month	Livermore Valley upwind HOSP	Livermore Valley upwind FCC
	(10^{-12} Bq/mL)	
Jul[(a)]	821.4	310.4
Aug	612.4	547.6
Sep	651.2	930.6
Oct	3304.1	1431.9
Nov	1012.0	817.7
Dec	851.0	725.2
Annual median[(b)]	**790.0**	**699.3**
IQR[(c)]	**687.3**	**717.8**
Annual maximum[(d)]	**3503.9**	**2934.1**

[a] Sampling started in end of July. Only one sample result for this month.

[b] The annual median is determined from the weekly data for July 23 through December 30.

[c] The interquartile range is determined from the weekly data for July 23 through December 30.

[d] The annual maximum is determined from the weekly data for July 23 through December 30.

Table 5-10. Tritium in air, Livermore Valley, 1997.

Month	ZON7	ALTA	FIRE	XRDS	VET	HOSP
	Sampling locations[a]					
	(10^{-9} Bq/mL)					
Jan	65.5 ± 12.3	25.0 ± 9.7	19.4 ± 9.2	<10.6	69.6 ± 12.6	10.3 ± 10.0
	<17.3	<19.6	16.5 ± 13.8	<12.5	41.1 ± 13.5	42.9 ± 18.3
Feb	45.9 ± 12.0	<12.1	28.2 ± 11.7	18.0 ± 11.5	44.8 ± 12.1	<11.3
	31.2 ± 9.9	16.4 ± 9.8	27.6 ± 10.4	10.2 ± 8.6	26.4 ± 9.7	<8.6
Mar	42.9 ± 8.0	25.7 ± 7.5	18.0 ± 6.9	15.8 ± 6.7	42.6 ± 7.9	12.8 ± 6.4
	55.5 ± 12.5	44.8 ± 11.7	22.6 ± 10.5	27.1 ± 11.2	76.2 ± 12.6	21.0 ± 10.4
Apr	114.7 ± 12.7	33.2 ± 9.9	24.0 ± 9.0	21.5 ± 9.9	37.0 ± 10.2	<8.7
	35.4 ± 9.1	17.1 ± 8.2	<9.3	11.7 ± 8.6	19.5 ± 10.1	<8.2
May	68.1 ± 13.0	—[b]	14.4 ± 11.6	23.6 ± 11.0	<10.7	<9.7
	61.4 ± 11.1		<9.5	<9.4	<9.4	<10.0
	84.7 ± 13.1		<10.7	37.7 ± 10.5	32.3 ± 11.5	13.7 ± 10.0
Jun	488.4 ± 25.9		<11.4	<11.4	<11.1	<11.9
	245.3 ± 16.2		<9.3	38.9 ± 9.8	11.8 ± 9.5	<9.7
Jul	115.4 ± 13.9		<10.7	24.4 ± 11.3	23.2 ± 12.1	<11.1
	94.4 ± 13.7		<11.0	<10.3	18.4 ± 11.8	<15.1
Aug	78.4 ± 12.8		13.4 ± 10.5	21.4 ± 10.3	15.5 ± 10.8	<10.8
	105.1 ± 18.5		<15.5	<15.4	<15.4	<15.4
Sep	102.9 ± 13.2		<9.6	13.2 ± 9.5	<9.7	<10.0
	97.3 ± 14.5		<11.3	12.2 ± 9.5	12.9 ± 10.8	<11.6
Oct	55.9 ± 10.6		27.1 ± 9.8	27.5 ± 9.0	39.2 ± 10.3	<8.8
	27.2 ± 10.0		10.3 ± 9.6	11.5 ± 8.6	16.6 ± 8.9	11.2 ± 9.6
	45.5 ± 7.5		9.4 ± 6.1	<5.7	—[c]	<6.2
Nov	29.6 ± 10.0		<9.3	10.7 ± 8.9	14.4 ± 8.1	<8.9
	13.3 ± 10.4		19.6 ± 9.6	<11.1	28.9 ± 10.7	<11.8
Dec	17.5 ± 10.0		18.1 ± 10.4	<8.1	32.9 ± 10.0	<9.6
	15.2 ± 5.9		17.0 ± 5.9	18.1 ± 6.3	41.8 ± 7.0	7.8 ± 6.3
Median[d]	**58.6**	**<22.3**	**<13.9**	**<12.9**	**23.2**	**<10.5**
IQR[e]	**64.4**	**—[f]**	**—[f]**	**—[f]**	**—[f]**	**—[f]**
Fraction of DCG[g]	**1.6×10^{-5}**	**$<6.0 \times 10^{-6}$**	**$<3.8 \times 10^{-6}$**	**$<3.5 \times 10^{-6}$**	**6.3×10^{-6}**	**$<2.9 \times 10^{-6}$**
Dose (mSv)[h]	**1.3×10^{-5}**	**4.8×10^{-6}**	**3.8×10^{-6}**	**2.8×10^{-6}**	**5.0×10^{-6}**	**2.8×10^{-5}**
	µCi/mL					
Median[d]	**1.6×10^{-12}**	**$<6.0 \times 10^{-13}$**	**$<3.8 \times 10^{-13}$**	**$<3.5 \times 10^{-13}$**	**$<6.3 \times 10^{-13}$**	**$<2.9 \times 10^{-13}$**
IQR[e]	**1.7×10^{-12}**	**—[f]**	**—[f]**	**—[f]**	**—[f]**	**—[f]**
Dose (mrem)[h]	**1.3×10^{-3}**	**4.8×10^{-4}**	**3.0×10^{-4}**	**2.8×10^{-4}**	**5.0×10^{-4}**	**2.3×10^{-4}**

Note: Radionuclide results are reported ±2σ. See Chapter 13, Quality Assurance.

a See Figure 5-2, main volume, for sampling locations.

b Sampling site removed.

c No data. See Chapter 13, Quality Assurance.

d Livermore Valley overall median = 16.5×10^{-9} Bq/mL (4.5×10^{-13} µCi/mL).

e Interquartile range.

f No measure of dispersion calculated. See Chapter 13, Quality Assurance.

g Derived Concentration Guide (DCG) = 3.7×10^{-3} Bq/mL (1×10^{-7} µCi/mL).

h This dose is the effective dose equivalent.

Table 5-11. Tritium in air, Livermore site perimeter, 1997.

Month	SALV	MESQ	CAFE	MET	VIS	COW	POOL
	Sampling location[a]						
	(10^{-9} Bq/mL)						
Jan	84.4 ± 12.2	74.7 ± 12.5	209.4 ± 15.9	61.8 ± 12.4	114.3 ± 13.1	177.6 ± 15.6	481.0 ± 23.1
	55.9 ± 15.6	64.4 ± 16.8	138.4 ± 17.6	41.4 ± 17.1	38.5 ± 14.9	81.0 ± 17.3	303.8 ± 21.6
Feb	88.4 ± 14.3	98.1 ± 14.3	131.0 ± 14.4	46.6 ± 12.0	—[b]	103.6 ± 15.0	244.9 ± 17.9
	73.3 ± 11.7	45.5 ± 11.1	161.0 ± 13.4	59.9 ± 11.1	102.1 ± 12.2	77.0 ± 11.7	250.5 ± 16.5
Mar	64.8 ± 9.5	38.1 ± 7.9	107.7 ± 9.4	33.4 ± 7.8	135.1 ± 14.6	85.1 ± 9.4	—[b]
	105.5 ± 14.4	102.1 ± 13.9	195.4 ± 15.4	49.2 ± 11.8	167.2 ± 16.4	112.9 ± 14.3	—[b]
Apr	96.2 ± 11.8	77.7 ± 11.1	521.7 ± 19.8	43.7 ± 9.9	336.3 ± 22.9	153.2 ± 11.9	1727.9 ± 46.7
	62.5 ± 10.4	24.0 ± 9.5	169.5 ± 13.6	17.1 ± 8.9	153.2 ± 13.3	88.8 ± 11.6	525.4 ± 31.5
May	85.8 ± 14.2	13.4 ± 10.8	239.4 ± 17.0	<10.5	484.7 ± 27.1	205.4 ± 17.2	436.6 ± 28.8
	75.9 ± 13.2	11.2 ± 11.0	43.3 ± 11.3	21.2 ± 10.9	183.9 ± 15.3	104.7 ± 13.7	112.5 ± 22.3
	185.7 ± 17.6	23.9 ± 11.0	129.1 ± 14.7	23.3 ± 11.4	706.7 ± 29.7	195.7 ± 17.0	267.5 ± 37.7
Jun	42.2 ± 14.2	<12.0	31.8 ± 17.4	<11.6	205.4 ± 17.9	181.7 ± 18.3	78.1 ± 25.0
	106.9 ± 12.9	14.0 ± 9.6	124.3 ± 8.8	24.9 ± 9.6	640.1 ± 23.7	131.0 ± 13.4	358.5 ± 25.8
Jul	118.8 ± 15.2	<11.9	201.7 ± 17.1	<11.3	341.5 ± 19.5	140.6 ± 15.7	290.8 ± 27.6
	83.6 ± 19.7	<10.9	68.8 ± 13.5	<10.6	225.3 ± 18.0	206.1 ± 17.5	136.5 ± 21.6
Aug	64.0 ± 11.8	25.4 ± 11.2	128.8 ± 15.7	12.7 ± 10.2	219.0 ± 15.8	166.1 ± 15.6	182.8 ± 21.8
	403.3 ± 46.4	18.6 ± 16.1	72.9 ± 18.2	<15.9	580.9 ± 34.9	142.1 ± 20.2	91.4 ± 29.0
Sep	44.0 ± 10.8	<10.4	130.6 ± 15.2	15.4 ± 10.6	239.4 ± 17.7	363.7 ± 21.1	117.3 ± 20.5
	66.2 ± 12.5	22.6 ± 12.2	61.4 ± 13.6	20.2 ± 10.8	311.2 ± 22.7	185.7 ± 18.0	178.7 ± 22.3
Oct	211.3 ± 17.5	91.4 ± 12.6	206.5 ± 15.3	81.4 ± 12.0	202.0 ± 15.8	125.8 ± 13.5	407.0 ± 26.9
	—[b]	37.7 ± 10.4	55.1 ± 10.5	24.6 ± 9.5	152.8 ± 16.5	99.5 ± 12.8	265.7 ± 21.5
	54.0 ± 8.0	31.0 ± 7.3	89.5 ± 9.0	22.5 ± 6.6	59.9 ± 7.7	47.4 ± 7.9	296.7 ± 18.1
Nov	53.3 ± 12.2	69.6 ± 11.1	86.6 ± 11.5	40.7 ± 9.6	139.1 ± 17.4	57.4 ± 11.1	176.9 ± 18.5
	—[b]	39.6 ± 12.6	104.7 ± 13.0	50.3 ± 12.6	99.2 ± 15.9	46.3 ± 12.2	188.0 ± 19.2
Dec	58.5 ± 14.8	66.6 ± 11.1	145.0 ± 13.0	37.7 ± 10.0	83.6 ± 17.0	92.9 ± 12.6	328.2 ± 19.6
	63.3 ± 7.8	55.9 ± 7.8	243.5 ± 12.6	30.0 ± 6.7	64.0 ± 8.5	31.5 ± 7.0	414.4 ± 16.7
Median[c]	**74.6**	**34.4**	**129.9**	**24.8**	**183.9**	**119.3**	**266.6**
IQR[d]	**37.0**	**50.9**	**101.6**	**—[e]**	**196.8**	**88.7**	**192.4**
Fraction of DCG[f]	$\mathbf{2.0 \times 10^{-5}}$	$\mathbf{9.3 \times 10^{-6}}$	$\mathbf{3.5 \times 10^{-5}}$	$\mathbf{6.7 \times 10^{-6}}$	$\mathbf{5.0 \times 10^{-5}}$	$\mathbf{3.2 \times 10^{-5}}$	$\mathbf{7.2 \times 10^{-5}}$
Dose (mSv)[g]	$\mathbf{1.6 \times 10^{-5}}$	$\mathbf{7.4 \times 10^{-6}}$	$\mathbf{2.8 \times 10^{-5}}$	$\mathbf{5.3 \times 10^{-6}}$	$\mathbf{3.9 \times 10^{-5}}$	$\mathbf{2.6 \times 10^{-5}}$	$\mathbf{5.7 \times 10^{-5}}$
	(µCi/mL)						
Median[c]	$\mathbf{2.0 \times 10^{-12}}$	$\mathbf{9.3 \times 10^{-13}}$	$\mathbf{3.5 \times 10^{-12}}$	$\mathbf{6.7 \times 10^{-13}}$	$\mathbf{5.0 \times 10^{-12}}$	$\mathbf{3.2 \times 10^{-12}}$	$\mathbf{7.2 \times 10^{-12}}$
IQR[d]	$\mathbf{1.0 \times 10^{-12}}$	$\mathbf{1.4 \times 10^{-12}}$	$\mathbf{2.7 \times 10^{-12}}$	**—[e]**	$\mathbf{5.3 \times 10^{-12}}$	$\mathbf{2.4 \times 10^{-12}}$	$\mathbf{5.2 \times 10^{-12}}$
Dose(mrem)[g]	$\mathbf{1.6 \times 10^{-3}}$	$\mathbf{7.4 \times 10^{-4}}$	$\mathbf{2.8 \times 10^{-3}}$	$\mathbf{5.3 \times 10^{-4}}$	$\mathbf{3.9 \times 10^{-3}}$	$\mathbf{2.6 \times 10^{-3}}$	$\mathbf{5.7 \times 10^{-3}}$

Note: Radionuclide results are reported $\pm 2\sigma$. See Chapter 13, Quality Assurance.

a See Figure 5-1, main volume, for sampling locations.

b No data. See Chapter 13, Quality Assurance.

c Livermore site overall median = 91.4×10^{-9} Bq/mL (2.5×10^{-12} µCi/mL).

d Interquartile range.

e No measure of dispersion calculated. See Chapter 13, Quality Assurance.

f Derived Concentration Guide (DCG) = 3.7×10^{-3} Bq/mL (1×10^{-7} µCi/mL).

g This dose is the effective dose equivalent.

Table 5-12. Tritium in air at locations near diffuse sources, 1997.

Month	Sampling locations[a]			
	B292	B331	B514	B624
	(10^{-9} Bq/mL)			
Jan	296.7 ± 18.7	1957.3 ± 41.1	555.0 ± 21.6	4366.0 ± 61.1
	124.3 ± 18.3	799.2 ± 32.8	327.8 ± 23.3	2242.2 ± 56.1
Feb	181.3 ± 17.0	1010.1 ± 33.3	643.8 ± 25.8	2682.5 ± 51.0
	173.9 ± 15.0	710.4 ± 26.3	625.3 ± 22.5	2997.0 ± 50.9
Mar	137.6 ± 10.9	588.3 ± 18.8	1861.1 ± 31.6	3045.1 ± 42.6
	188.7 ± 15.5	950.9 ± 29.5	4218.0 ± 59.1	3600.1 ± 57.6
Apr	212.8 ± 14.3	2009.1 ± 36.2	4514.0 ± 58.7	4625.0 ± 60.1
	159.8 ± 13.6	1705.7 ± 34.1	3207.9 ± 44.9	2978.5 ± 41.7
May	75.9 ± 11.8	2060.9 ± 47.4	7733.0 ± 100.5	2930.4 ± 55.7
	225.3 ± 17.1	1357.9 ± 33.9	6068.0 ± 66.7	2989.6 ± 50.8
	795.5 ± 28.6	4144.0 ± 435.1	6401.0 ± 76.8	4625.0 ± 69.4
Jun	50.0 ± 12.7	1731.6 ± 46.8	6364.0 ± 82.7	1121.1 ± 37.0
	140.6 ± 12.9	1502.2 ± 36.1	6438.0 ± 77.3	7104.0 ± 78.1
Jul	59.9 ± 12.8	1202.5 ± 34.9	5180.0 ± 67.3	7400.0 ± 81.4
	61.8 ± 12.4	947.2 ± 31.3	5957.0 ± 77.4	6660.0 ± 79.9
Aug	59.6 ± 12.1	1161.8 ± 32.5	5809.0 ± 389.2	7326.0 ± 80.6
	52.5 ± 17.4	1232.1 ± 40.7	6660.0 ± 99.9	7733.0 ± 100.5
Sep	74.4 ± 12.6	1261.7 ± 35.3	5735.0 ± 68.8	2993.3 ± 53.9
	91.0 ± 14.2	1184.0 ± 35.5	5624.0 ± 78.7	3585.3 ± 61.0
Oct	163.5 ± 14.7	1406.0 ± 33.7	4551.0 ± 63.7	5513.0 ± 66.2
	115.8 ± 14.1	1357.9 ± 33.9	3330.0 ± 50.0	4514.0 ± 63.2
	64.4 ± 8.1	3248.6 ± 42.2	2142.3 ± 32.1	3996.0 ± 48.0
Nov	99.2 ± 12.6	9953.0 ± 89.5	4144.0 ± 62.2	7400.0 ± 81.4
	108.4 ± 14.8	2760.2 ± 51.8	3422.5 ± 51.8	5698.0 ± 74.0
Dec	73.6 ± 15.2	1313.5 ± 30.3	2153.4 ± 41.1	5143.0 ± 67.0
	88.4 ± 8.5	—[b]	1365.3 ± 25.9	3019.2 ± 40.7
Median[c]	**112.1**	**1357.9**	**4366.0**	**4181.0**
IQR[d]	**97.5**	**795.5**	**3774.9**	**2657.5**
Fraction of DCG[e]	$\mathbf{3.0 \times 10^{-5}}$	$\mathbf{3.7 \times 10^{-4}}$	$\mathbf{1.2 \times 10^{-3}}$	$\mathbf{1.1 \times 10^{-3}}$
Dose (mSv)[f]	$\mathbf{2.4 \times 10^{-5}}$	$\mathbf{2.9 \times 10^{-4}}$	$\mathbf{9.4 \times 10^{-4}}$	$\mathbf{9.0 \times 10^{-4}}$
	(µCi/mL)			
Median[c]	$\mathbf{3.0 \times 10^{-12}}$	$\mathbf{3.7 \times 10^{-11}}$	$\mathbf{1.2 \times 10^{-10}}$	$\mathbf{1.1 \times 10^{-10}}$
IQR[d]	$\mathbf{2.6 \times 10^{-12}}$	$\mathbf{2.2 \times 10^{-11}}$	$\mathbf{1.0 \times 10^{-10}}$	$\mathbf{7.2 \times 10^{-11}}$
Dose (mrem)[f]	$\mathbf{2.4 \times 10^{-3}}$	$\mathbf{2.9 \times 10^{-2}}$	$\mathbf{9.4 \times 10^{-2}}$	$\mathbf{9.0 \times 10^{-2}}$

Note: Radionuclide results are reported $\pm 2\sigma$. See Chapter 13, Quality Assurance.

a See Figure 5-1, main volume, for sampling locations.

b No data. See Chapter 13, Quality Assurance.

c Diffuse source overall median = 1957×10^{-9} Bq/mL (5.3×10^{-11} µCi/mL).

d Interquartile range.

e Derived Concentration Guide (DCG) = 3.7×10^{-3} Bq/mL (1×10^{-7} µCi/mL).

f This dose is the effective dose equivalent.

Table 5-13. Beryllium in air particulate samples (in pg/m^3), Livermore site perimeter, 1997.

Month	Sampling location(a)					
	SALV	MESQ	CAFE	VIS	MET	COW
Jan	1.5	1.7	6.0	0.8	0.7	1.3
Feb	2.2	3.8	5.5	2.4	2.8	5.9
Mar	4.8	9.7	8.4	4.6	5.7	9.0
Apr	4.5	16.9	7.5	3.0	4.3	5.8
May	6.2	12.1	8.6	6.2	6.5	8.1
Jun	4.5	16.8	6.2	5.9	6.6	9.3
Jul	9.2	23.3	11.7	6.8	9.6	12.4
Aug	6.8	25.8	13.5	9.0	9.9	15.6
Sep	9.3	25.2	12.4	13.3	14.1	17.5
Oct	9.5	19.8	14.1	9.9	12.1	12.5
Nov	21.8	5.3	4.4	2.8	3.6	3.6
Dec	1.7	3.0	3.5	3.3	2.0	2.8
Median(b)	**5.5**	**14.5**	**7.9**	**5.3**	**6.1**	**8.6**
Maximum	**21.8**	**25.8**	**14.1**	**13.3**	**14.1**	**17.5**
IQR(c)	**5.3**	**15.8**	**6.0**	**4.4**	**6.3**	**7.1**
Fraction of ACG(d)	**5.5×10^{-4}**	**1.4×10^{-3}**	**7.9×10^{-4}**	**5.3×10^{-4}**	**6.1×10^{-4}**	**8.6×10^{-4}**

a See Figure 5-1, main volume, for sampling locations.

b Livermore site perimeter overall annual median is 6.6 pg/m^3.

c Interquartile range.

d The monthly Ambient Concentration Guide (ACG) set by the Bay Area Air Quality Management District (BAAQMD) is 10,000 pg/m^3.

Table 5-14. Gross alpha and gross beta activities summarized by month and location, Site 300,[a] 1997.

Month	801E	ECP	EOBS	GOLF	NPS	WCP	WOBS	TFIR	PRIM
Gross alpha	(10^{-12} Bq/mL)								
Jan	9.0	41.9	23.3	–3.2	–20.1	10.3	3.4	48.0	–0.4
Feb	–1.5	44.9	–30.9	30.2	20.4	–19.2	–1.5	20.9	–12.1
Mar	34.1	13.4	41.2	36.7	–11.5	–5.6	–18.6	38.2	22.4
Apr[b]	31.8	2.4	16.7	19.2	32.7	19.5	10.3	35.3	24.0
May	42.1	45.8	35.8	26.4	23.9	33.7	37.4	78.3	22.6
Jun	2.8	5.7	10.7	20.9	10.5	14.7	9.2	11.9	19.3
Jul	42.5	20.6	13.6	54.4	25.9	37.1	50.9	33.1	41.8
Aug	41.9	41.8	31.2	64.5	21.3	19.5	41.5	38.6	34.8
Sept	8.4	4.2	10.2	4.3	–6.5	–6.5	5.4	0.5	8.4
Oct	24.4	11.3	–6.4	26.8	22.0	29.5	27.6	29.5	21.4
Nov	33.1	–7.2	1.1	7.0	–2.7	–22.1	5.4	–19.1	0.9
Dec	10.7	8.5	–2.7	6.0	5.6	7.6	–29.1	–5.6	–2.8
Annual median[c]	**23.2**	**13.1**	**14.1**	**21.8**	**12.3**	**14.5**	**9.6**	**26.6**	**17.2**
IQR[c,d]	**32.7**	**44.0**	**31.5**	**43.4**	**39.8**	**43.3**	**58.7**	**48.0**	**43.8**
Annual maximum[c]	**97.2**	**73.3**	**94.1**	**97.9**	**64.3**	**89.1**	**91.1**	**149.4**	**80.5**
Gross beta									
Jan	192.1	195.8	128.9	204.0	154.5	155.3	144.3	330.7	295.6
Feb	254.9	314.6	332.1	240.1	294.3	277.9	276.4	487.9	300.8
Mar	383.9	219.7	139.6	280.8	304.8	284.1	313.4	313.6	277.2
Apr[b]	512.9	484.6	506.8	447.3	514.1	469.9	539.5	524.8	461.1
May	624.5	636.6	706.7	582.3	661.7	665.0	650.6	598.5	634.4
Jun	549.4	513.9	507.9	523.4	502.1	431.0	545.0	482.3	475.6
Jul	750.3	758.7	643.7	601.6	782.5	629.6	801.3	657.9	757.6
Aug	679.2	641.2	567.4	592.1	599.6	635.5	623.6	624.1	763.8
Sep	823.3	778.1	726.3	749.1	808.7	728.3	806.9	983.3	851.8
Oct	956.3	889.4	818.3	810.1	878.9	800.7	926.8	901.4	992.8
Nov	590.0	572.3	594.8	653.9	570.7	513.3	512.8	745.3	765.8
Dec	872.1	777.0	654.0	848.3	790.6	721.1	758.9	1013.4	937.5
Annual median[c]	**583.2**	**552.3**	**555.3**	**539.2**	**505.3**	**502.6**	**567.5**	**568.9**	**588.8**
IQR[c,d]	**318.5**	**281.2**	**280.0**	**193.9**	**319.7**	**299.4**	**306.1**	**285.0**	**373.1**
Annual maximum[c]	**1420.9**	**1669.3**	**1420.7**	**1422.6**	**1396.4**	**1283.3**	**1558.5**	**1796.5**	**1878.0**

a See Figure 5-3, main volume, for sampling locations.

b Filter media changed from cellulose to glass fiber. Samples from April through December were collected on glass fiber filters.

c As determined by data for the 52-week period.

d Interquartile range.

Table 5-15. Gamma activity in particulate air samples, Site 300,[a] 1997.

Month	^{7}Be	^{40}K	^{137}Cs	^{22}Na	^{226}Ra	^{228}Ra	^{228}Th
	(10^{-9} Bq/mL)	(10^{-12} Bq/mL)					
Jan	3.6 ± 0.1	<5.4	<0.2	<0.2	<0.4	<0.8	<0.4
Feb	4.2 ± 0.1	<3.1	<0.1	0.4 ± 0.3	<0.3	<0.5	<0.3
Mar	5.3 ± 0.1	<4.8	<0.2	<0.2	<0.4	<1.4	<0.4
Apr[b]	4.0 ± 0.1	31.7 ± 19.2	<0.2	<0.3	<5.3	<1.6	<0.8
May	5.5 ± 0.2	50.7 ± 16.0	<0.2	1.0 ± 0.7	<5.0	1.7 ± 1.7	1.5 ± 0.9
Jun	4.3 ± 0.1	23.8 ± 17.6	<0.2	<0.3	<5.2	<1.8	1.6 ± 1.0
Jul	4.6 ± 0.1	–1.1 ± 13.2	<0.1	0.6 ± 0.3	<4.0	<0.012	<0.6
Aug	4.1 ± 0.1	34.0 ± 12.5	<0.1	<0.2	<5.0	<0.9	1.3 ± 0.8
Sep	7.0 ± 0.4	35.7 ± 15.6	<0.2	0.6 ± 0.4	<9.0	2.5 ± 1.6	2.0 ± 0.9
Oct	4.3 ± 0.3	51.9 ± 15.2	<0.2	<0.3	<0.6	3.0 ± 1.7	2.9 ± 0.9
Nov	2.6 ± 0.1	21.5 ± 20.2	<0.2	<0.3	<0.8	<0.9	<0.1
Dec	3.3 ± 0.1	<2.8	<0.2	<0.3	<0.8	–0.4	<0.3
Median	**4.2**	**22.6**	**<0.2**	**<0.3**	**<2.4**	**<1.2**	**<0.72**
IQR[c]	**0.9**	—[d]	—[d]	—[d]	—[d]	—[d]	—[d]
Maximum	**7.0**	**51.9**	**<0.2**	**1.0**	**<9.0**	**3.0**	**2.9**
DCG[e]	**1.5×10^{-3}**	**3.3×10^{-5}**	**1.5×10^{-5}**	**3.7×10^{-5}**	**3.7×10^{-8}**	**1.1×10^{-7}**	**1.5×10^{-9}**
Median fraction of DCG	**2.8×10^{-6}**	**6.9×10^{-7}**	**$<1.4 \times 10^{-8}$**	**$<7.3 \times 10^{-9}$**	**$<6.5 \times 10^{-5}$**	**$<1.1 \times 10^{-5}$**	**$<4.8 \times 10^{-4}$**
	(µCi/mL)						
Median	**1.1×10^{-13}**	**6.1×10^{-16}**	**$<5.6 \times 10^{-18}$**	**$<7.3 \times 10^{-18}$**	**$<6.5 \times 10^{-17}$**	**$<3.2 \times 10^{-17}$**	**$<2.0 \times 10^{-17}$**
IQR[c]	**2.5×10^{-14}**	—[d]	—[d]	—[d]	—[d]	—[d]	—[d]
Maximum	**1.9×10^{-13}**	**1.4×10^{-15}**	**6.8×10^{-18}**	**2.6×10^{-17}**	**$<2.4 \times 10^{-16}$**	**8.2×10^{-17}**	**7.7×10^{-17}**
DCG[e]	**4.0×10^{-8}**	**9.0×10^{-10}**	**4.0×10^{-10}**	**1.0×10^{-9}**	**1.0×10^{-12}**	**3.0×10^{-12}**	**4.0×10^{-14}**

Note: Radionuclide results are reported ±2σ. See Chapter 13, Quality Assurance.

a See Figure 5-3, main volume, for sampling locations. All Site 300 samples are composited by month.

b Filter media changed from cellulose to glass fiber. Samples from April through December were collected on glass fiber filters.

c Interquartile range.

d No measure of dispersion calculated. See Chapter 13, Quality Assurance.

e Derived Concentration Guide (DOE 5400.5). See Chapter 12, Radiation Dose Assessment.

Table 5-16. Plutonium activity in air particulate samples, Site 300, 1997.

Month	Sampling location[a]		
	Site 300 composite	PRIM	TFIR
	(10^{-15} Bq/mL)		
Jan	2.6 ± 4.7		6.8 ± 13.9
Feb	–2.0 ± 1.5		–3.4 ± 9.4
Mar	2.5 ± 3.2	—[b]	–1.7 ± 19.1
Apr[c]	4.1 ± 2.8	0.4 ± 7.8	2.4 ± 9.8
May	6.7 ± 3.6	–0.6 ± 5.2	1.5 ± 6.3
Jun	3.5 ± 2.3	1.3 ± 10.1	6.2 ± 12.6
Jul	4.1 ± 2.6	—[d]	–3.9 ± 3.2
Aug	16.5 ± 5.2	6.4 ± 6.2	6.0 ± 5.3
Sep	3.6 ± 1.8	1.2 ± 6.7	4.6 ± 10.9
Oct	5.6 ± 3.5	–0.6 ± 7.1	3.3 ± 8.3
Nov	0.9 ± 1.1	–8.5 ± 4.8	13.5 ± 14.5
Dec	1.6 ± 1.6	–4.8 ± 8.5	–3.4 ± 6.4
Median	**3.6**	**–0.1**	**2.9**
IQR[e]	**2.2**	**2.9**	**8.1**
Fraction of DCG[f]	**4.8×10^{-6}**	—[g]	**3.9×10^{-6}**
	(μCi/mL)		
Median	**9.6×10^{-20}**	**-1.5×10^{-20}**	**7.7×10^{-20}**
IQR[e]	**6.0×10^{-20}**	**7.7×10^{-20}**	**2.2×10^{-19}**

Note: Radionuclide results are reported ±2σ. See Chapter 13, Quality Assurance.

a See Figure 5-3, main volume, for sampling locations.

b Sample site added.

c Filter media changed from cellulose to glass fiber. Samples from April through December were collected on glass fiber filters.

d Sample lost during analytical process.

e Interquartile range.

f Derived Concentration Guide (DCG) = 7.4×10^{-10} Bq/mL for ^{239}Pu activity in air (2×10^{-14} μCi/mL).

g Fraction of DCG not determined when median value is negative.

Table 5-17. Uranium mass in air particulate samples, Site 300, 1997.

Location[(a)]	Month	Uranium 238 (10^{-5} µg/m^3)	Uranium 235 (10^{-7} µg/m^3)	Uranium 235/238 (10^{-3})
Site 300	**Jan**	4	1.13	2.82
	Feb	18.1	4.26	2.35
	Mar	3.74	2.73	7.29
	Apr[(b)]	9.2	6.9	7.44
	May	3.7	3.1	8.22
	Jun	2.9	1.6	5.60
	Jul	7.0	4.2	6.04
	Aug	5.3	3.7	7.07
	Sep	7.8	6.1	7.83
	Oct	18.2	12.8	7.05
	Nov	3.4	2.2	6.41
	Dec	0.21	–0.16	—[(c)]
Median		**4.65**	**3.41**	**7.05**
IQR[(d)]		**4.49**	**2.67**	**1.54**
Maximum		**18.2**	**12.8**	**NA**
Fraction of DCG[(e)]		**1.6×10^{-4}**	**7.2×10^{-6}**	**NA**

a See Figure 5-3, main volume, for sampling locations.

b Filter media changed from cellulose to glass fiber. Samples from April through December were collected on glass fiber filters.

c Ratio not determined when the value of one of the masses is negative.

d Interquartile range.

e Derived Concentration Guide (DCG) = 0.3 µg/m^3 for ^{238}U activity in air; DCG = 0.047 µg/m^3 for ^{235}U activity in air.

NA = Not applicable.

Table 5-18. Tritium in air, Site 300, 1997.

Month	Sampling location[a]
	PRIM
	(10^{-9} Bq/mL)
Feb	<10.3
	<6.9
Mar	8.3 ± 5.5
	<8.4
Apr	<7.7
	<6.2
	<7.2
May	<6.4
	8.3 ± 7.6
Jun	<8.7
	<6.7
Jul	<6.7
	<7.0
Aug	6.5 ± 5.9
	<8.7
Sep	8.5 ± 6.9
	<8.0
Oct	<7.2
	10.1 ± 7.6
	<4.9
Nov	<7.8
	<9.6
Dec	<8.1
	<5.2
Median	**<7.7**
IQR[b]	**_[c]**
Fraction of DCG[d]	**$<2.1 \times 10^{-6}$**
Dose (mSv)[e]	**1.7×10^{-6}**
	(µCi/mL)
Median	**$<2.1 \times 10^{-13}$**
IQR[b]	**_[c]**
Dose (mrem)[e]	**1.7×10^{-4}**

Note: Radionuclide results are reported ±2σ. See Quality Assurance chapter.

a See Figure 5-3, main volume, for sampling locations.

b Interquartile range.

c No measure of dispersion calculated. See Chapter 13, Quality Assurance.

d Derived Concentration Guide (DCG) = 3.7×10^{-3} Bq/mL (1×10^{-7} µCi/mL).

e This dose is the effective dose equivalent.

Table 5-19. Beryllium in air particulate samples (in pg/m^3), Site 300 network, 1997.

Month	Sampling location[a]								
	EOBS	ECP	WCP	GOLF	TFIR	NPS	WOBS	801E	PRIM
Jan	0[b]	0.2	0[b]	3.7	1.8	0.2	0[b]	0.6	0.4
Feb	1.9	2.5	2.0	1.7	2.6	1.4	2.0	1.9	2.8
Mar	2.5	3.1	3.8	5.1	10.1	3.6	3.8	4.5	5.2
Apr	3.4	—[c]	—[c]	6.3	12.1	—[c]	—[c]	16.7	—[c]
May	3.9			5.0	11.3			11.3	
Jun	3.4			5.5	10.6			9.0	
Jul	6.2			10.6	14.9			13.5	
Aug	8.4			13.8	15.3			11.1	
Sep	10.3			12.5	19.7			15.5	
Oct	9.6			11.1	14.0			10.1	
Nov	1.9			2.1	3.5			2.4	
Dec	1.0			2.3	2.7			1.4	
Median[d]	**3.4**	**2.5**	**2.0**	**5.3**	**10.9**	**1.4**	**2.0**	**9.6**	**2.8**
Maximum	**10.3**	**3.1**	**3.8**	**13.8**	**19.7**	**3.6**	**3.8**	**16.7**	**5.2**
IQR[e]	**5.1**	**1.5**	**1.9**	**7.4**	**10.9**	**1.7**	**1.9**	**9.5**	**2.4**
Fraction of ACG[f]	3.4×10^{-4}	2.5×10^{-4}	2.9×10^{-4}	5.3×10^{-4}	1.1×10^{-3}	1.4×10^{-4}	2.9×10^{-4}	9.6×10^{-4}	2.8×10^{-4}

a See Figure 5-3, main volume, for sampling locations.

b Actual reported value

c Sampling site removed.

d Overall annual median is 3.8 pg/m^3.

e Interquartile range.

f The monthly Ambient Concentration Guide (ACG) set by the Bay Area Air Quality Management District (BAAQMD) is 10,000 pg/m^3.

6

Sewerable Water

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Methods and Data

LLNL operated a flow-proportional peristaltic pump composite sampler in Building 196 (main monitoring station B196) (main volume, Figure 6-1), that created a 24-hour composite of Livermore site sewage effluent by taking a sample for every 3765 L of effluent. Each day, 500-mL aliquots of this 24-hour composite were transferred to polyethylene bottles. Aliquots were submitted for analysis as follows:

First, two aliquots were submitted to LLNL's Hazards Control Analytical Laboratory (HCAL) for daily analyses of the gross alpha, gross beta, and tritium activity. For the gross alpha and gross beta analyses, HCAL digested a 200-mL aliquot plated the digestate onto a planchette, and submitted the planchette to the Hazards Control Radiological Measurements Laboratory (HCRML) for a 60-min count in a gas proportional counter. At the start of November 1997, the count-time was increased to 100 min. For the tritium analyses, HCAL distilled a 100-mL aliquot and submitted the distillate to the HCRML. The HCRML prepared the distillate scintillation cocktail and counted it for 100 min in a liquid scintillation counter. The analytical results for the gross alpha, gross beta, and tritium analyses are shown in **Table 6-1**.

Finally, an aliquot was submitted to LLNL's Chemistry and Materials Science Environmental Services (CES). Each month, CES created a composite sample from the aliquots submitted for that month and analyzed it first for ^{239}Pu and then for ^{137}Cs. CES began the ^{239}Pu analysis by adding MnO_2 to the entire volume of the monthly composite sample, approximately 15 L, to precipitate the plutonium. After digestion of the composite volume with concentrated HNO_3, ion-exchange chromatography was used to separate out the plutonium from the rest of the sample. The plutonium eluted from the ion-exchange column was electroplated onto a stainless steel disk, and its activity measured by alpha spectroscopy. It should be noted that CES, prior to beginning analysis for ^{137}Cs activity in the monthly composite, returned any non-plutonium sample material generated from the ion-exchange process to the monthly composite sample, preventing ^{137}Cs loss. For the ^{137}Cs analysis, CES added NH_4MoPO_4 to the monthly composite sample in order to precipitate the cesium and then counted the composite sample using gamma spectroscopy. The analytical results for the ^{239}Pu and ^{137}Cs analyses are reported in the main volume, Table 6-6.

LLNL also operated monitoring station C196 with a flow proportional peristaltic pump composite sampler adjacent to monitoring station B196. This sampler functioned as a weekly composite sampler, except for the first four months of the year, when for one day a month it served as a single-day composite sampler. This practice was discontinued in May when a second sampler was dedicated to acquiring the monthly sample, thereby freeing the weekly sampler to collect continuously over a seven-day sampling period. When operated in the weekly compositing mode, the sampler acquired a 30-mL sample for every 30,280 L of effluent discharged. The monthly sampler operates as a single-day composite sampler, running for 24 hours, collecting a 150-mL sample for every 7570 L of effluent discharged.

Aliquots were acquired each week from the weekly composite sample and every month from the 24-hour composite sample. From each weekly composite (and each monthly 24-hour composite), one 1-L aliquot was transferred to a polyethylene bottle. This aliquot was submitted to an off-site contract laboratory for aluminum, arsenic, beryllium, cadmium, chromium, copper, iron, lead, mercury, nickel, silver, and zinc analyses. The results for these analyses are presented in **Tables 6-2** and **6-3**; the EPA Methods used for these analyses are identified by the method numbers 200.7, 206.2, 210.2, 200.7, 200.7, 200.7, 200.7, 239.2, 245.2, 249.2, 200.7, and 200.7, respectively. Two additional aliquots were submitted each week from the weekly composite. These two aliquots are analyzed by HCAL for gross alpha, beta, and tritium activities. A subset of these results contribute to the completeness of the daily analytical results for gross alpha, gross beta, and tritium; this subset is reported and footnoted in **Table 6-1**.

Aliquots were submitted to the contract analytical laboratory for a far more extensive set of analyses on the 24-hour composite than the weekly composite sample. Under the heading of “Composite sample,” **Table 6-4** lists these results by month, parameters, and the EPA method numbers used for the analyses. The analytical methods are EPA methods unless otherwise indicated. It should be noted that only **Table 6-3** reports the monthly metals analytical results for those metals mentioned in the previous paragraph. In addition to the **Table 6-4** aliquots from the 24-hour composite, two 500-mL aliquots were submitted to HCAL until May 1997 when this practice was discontinued. At that time, the second sampler (previously described) was added. These aliquots were submitted for analyses of the gross alpha, beta, and tritium activities. The results for the analyses were recorded with the gross alpha, gross beta, and tritium results from the weekly composite.

Concurrent with the monthly acquisition of a 24-hour composite, a portable peristaltic pump sampler collected instantaneous grab samples from the sewage stream in the vault adjacent to monitoring station B196. These samples are submitted to a contract analytical laboratory for additional monitoring of water quality parameters and organic compounds. The results of this monitoring are found in **Table 6-4** under the “Grab sample” heading. The table lists the parameters and the EPA method numbers used for the analyses. The last four entries are for oil and grease analysis of samples that were acquired at 4-hour intervals during the day, showing the time of collection of each oil and grease sample.

A flow chart recorder is located inside monitoring station B196, and an ultrasonic flow sensor is installed in an adjacent unit. A flow totalizer reading from the flow chart recorder was entered into the B196 daily sampling log every day when the B196 daily composite sample was acquired. The daily total flows are determined by subtracting sequentially recorded flow totalizer readings. For days that flow totalizer readings are not available, daily flow totals are estimated. **Tables 6-5a** and **b** present the daily total flows and monthly annual flow summary statistics for 1997.

Discharges of treated ground water to the sanitary sewer must comply with the terms and conditions in Permit 1510G(97), issued by the Livermore Water Reclamation Plant (LWRP). Through negotiation with the LWRP, the conditions of the two permits (1508G and 1510G) previously issued for discharge of treated ground water to the sanitary sewer were combined to create a single permit (1510G) in 1997. This change eased the monitoring and reporting criteria.

The self-monitoring program prescribed in 1510G(97) requires monitoring for total toxic organic compounds on all discharges. Ground water discharges from treatability studies must also meet limits for metals; however, none of the ground water discharges in 1997 were generated from treatability studies. There is no requirement for sampling cyanide. **Table 6-6** shows discharge dates and monitoring data for the required organic analysis.

Two 500-mL aliquots of treated effluent from LWRP were collected daily by LWRP employees. These daily 500-mL aliquots were used to create two different composite samples. The first of the samples contained a week of daily aliquots. This weekly sample, composited in a 1-gal polyethylene bottle, was collected each week by LLNL and submitted to HCAL for gross alpha, gross beta, and tritium analyses. **Table 6-7** shows the tritium results for the LWRP weekly composite sample. The other composite sample contained a month of daily aliquots. This monthly sample, composited in a 5-gallon polyethylene carboy, was collected each month by LLNL. CES analyzes the monthly composite for ^{137}Cs using gamma spectroscopy and for ^{239}Pu using alpha spectroscopy. These results are presented in the main volume, Chapter 6.

Two 500-mL composite samples from each of the LWRP digesters were acquired monthly by LWRP employees. The composites consisted of aliquots taken from the circulating sludge once a week. Every month LLNL collected the composite samples and submitted one 500-mL composite to HCAL and one to CES. HCAL analyzes the monthly composite for gross radioactivity and metals. CES composites all of the monthly samples on a quarterly basis and analyzed the quarterly composites for plutonium, cesium, and gamma-emitting radionuclides, using alpha spectroscopy for the plutonium and gamma spectroscopy for the cesium and gamma-emitting radionuclides. Table 6-5 in the main volume shows the results for the ^{239}Pu analyses.

Standard quality control and quality assurance procedures were followed. When each sewage field sample was collected, it was labeled with the sampling location and date of sampling. In the laboratory, each sample was assigned a number that accompanied that sample during analysis. Additionally, split samples accounted for approximately 10% of the samples submitted for analytical work in 1997.

Table 6-1. Daily monitoring results for gross alpha, gross beta, and tritium in the sanitary sewer effluent, 1997.

Date		Gross alpha (μBq/mL)		Gross beta (mBq/mL)		Tritium (mBq/mL)	
		Activity[(a)]	LOS[(b)]	Activity[(a)]	LOS[(b)]	Activity[(a)]	LOS[(b)]
January	1	16.6	165	0.273 ± 0.11	0.159	12.7 ± 6.2	10.7
	2	22.5	148	0.130	0.156	16.5 ± 6.6	10.1
	3	95.1	165	0.249 ± 0.11	0.159	13.9 ± 6.4	11.0
	4	–2.45	184	0.670 ± 0.15	0.162	5.14	10.8
	5	48.1	181	0.266 ± 0.12	0.161	6.40	10.4
	6	83.3	180	0.243 ± 0.11	0.161	10.9	10.9
	7	230	236	0.847 ± 0.17	0.171	7.92	10.7
	8	133	216	0.788 ± 0.16	0.167	4.33	11.0
	9	50.3	224	0.710 ± 0.16	0.169	3.37	11.0
	10	96.2	221	0.899 ± 0.17	0.168	0.389	10.6
	11	119	178	0.246 ± 0.11	0.161	9.25	10.8
	12	18.4	176	0.254 ± 0.11	0.160	9.69	10.5
	13	34.8	194	0.308 ± 0.12	0.163	9.77	10.7
	14	38.1	215	0.833 ± 0.17	0.167	7.03	10.3
	15	–80.3	206	0.655 ± 0.15	0.165	6.92	10.7
	16	82.5	208	0.537 ± 0.14	0.166	0.807	10.7
	17	88.4	233	0.907 ± 0.17	0.172	7.25	10.8
	18	–56.6	217	0.673 ± 0.15	0.167	5.62	10.7
	19	84.4	196	0.351 ± 0.13	0.163	6.03	11.0
	20	–22.3	172	0.118	0.159	1.28	11.0
	21	61.1	194	0.400 ± 0.13	0.162	1.35	11.2
	22	161	193	0.503 ± 0.14	0.162	13.8 ± 6.6	10.8
	23	–9.32	186	0.400 ± 0.13	0.162	4.33	11.0
	24	–7.92	191	0.381 ± 0.13	0.163	4.07	10.6
	25	0.707	279	0.810 ± 0.17	0.177	137 ± 9	10.2
	26	127	231	0.315 ± 0.13	0.171	5.07	10.4
	27	40.7	217	0.282 ± 0.12	0.168	3.15	10.7
	28	116	206	0.518 ± 0.14	0.165	–4.66	11.7
	29	328 ± 140	195	1.72 ± 0.21	0.164	–1.92	10.9
	30	–60.3	192	0.566 ± 0.14	0.163	–1.08	10.7
	31	–52.9	220	0.670 ± 0.15	0.167	5.14	11.2
February	1	–72.2	189	0.242 ± 0.12	0.162	7.14	10.7
	2	8.81	244	0.448 ± 0.14	0.172	6.70	10.7
	3	119	223	0.367 ± 0.13	0.168	10.0	10.6
	4	317	429	1.72 ± 0.33	0.334	670 ± 16	10.6
	5	27.5	200	0.533 ± 0.14	0.164	5.14	10.5

Table 6-1. Daily monitoring results for gross alpha, gross beta, and tritium in the sanitary sewer effluent, 1997 (continued).

Date		Gross alpha (µBq/mL)		Gross beta (mBq/mL)		Tritium (mBq/mL)	
		Activity(a)	LOS(b)	Activity(a)	LOS(b)	Activity(a)	LOS(b)
February	6	52.2	186	0.422 ± 0.13	0.162	25.4 ± 6.6	10.4
	7	57.0	374	1.15 ± 0.29	0.324	703 ± 16	10.7
	8	215	345	0.666 ± 0.24	0.320	5.44	10.7
	9	38.1	219	0.306 ± 0.13	0.168	12.2 ± 6.4	10.5
	10	–19.8	230	0.496 ± 0.14	0.171	11.1 ± 6.7	10.5
	11	14.6	229	0.833 ± 0.17	0.170	5.33	10.6
	12	87.3	255	0.858 ± 0.17	0.175	4.00	10.5
	13	–45.9	212	0.803 ± 0.16	0.168	5.81	10.7
	14	–196	264	1.34 ± 0.20	0.176	7.25	10.8
	15	56.2	223	0.995 ± 0.18	0.170	6.29	10.5
	16	28.9	192	0.271 ± 0.12	0.164	8.21	10.6
	17	144	188	0.351 ± 0.13	0.164	8.73	10.4
	18	21.7	219	0.740 ± 0.16	0.169	2.90	10.3
	19	77.3	178	0.540 ± 0.14	0.161	–1.31	11.0
	20	61.4	206	0.833 ± 0.16	0.165	6.70	10.4
	21	15.7	202	0.696 ± 0.15	0.164	0.940	11.1
	22	141	212	0.855 ± 0.16	0.166	6.44	10.4
	23	57.0	184	0.381 ± 0.13	0.161	2.52	10.8
	24	76.6	188	0.370 ± 0.13	0.162	2.62	10.9
	25	47.7	203	0.762 ± 0.16	0.164	–11.1	11.9
	26	–78.1	207	0.718 ± 0.15	0.164	–11.4	11.8
	27	10.7	203	0.581 ± 0.15	0.163	–0.588	11.1
	28	142	221	0.710 ± 0.16	0.168	222 ± 10	10.4
March	1	–9.36	200	0.818 ± 0.16	0.162	–4.88	11.4
	2	389 ± 170	184	0.577 ± 0.14	0.160	1.01	11.0
	3	208 ± 140	205	0.481 ± 0.13	0.165	–2.38	11.5
	4	–64.0	198	0.907 ± 0.16	0.165	–2.01	11.2
	5	–67.0	194	0.925 ± 0.17	0.164	5.18	10.8
	6	15.2	199	0.847 ± 0.16	0.165	104 ± 9	10.7
	7	481 ± 260	389	1.59 ± 0.32	0.327	1410 ± 23	11.0
	8	204 ± 120	199	0.814 ± 0.16	0.164	5.51	10.8
	9	142	184	0.363 ± 0.12	0.161	13.6 ± 6.4	11.0
	10	–10.9	175	0.347 ± 0.12	0.160	2.10	11.3
	11	207	213	0.981 ± 0.18	0.168	169 ± 10	11.1
	12	–35.2	216	1.01 ± 0.17	0.168	8.07	11.1

Table 6-1. Daily monitoring results for gross alpha, gross beta, and tritium in the sanitary sewer effluent, 1997 (continued).

Date		Gross alpha (μBq/mL)		Gross beta (mBq/mL)		Tritium (mBq/mL)	
		Activity[(a)]	LOS[(b)]	Activity[(a)]	LOS[(b)]	Activity[(a)]	LOS[(b)]
March	13	32.0	203	0.903 ± 0.17	0.165	0.511	11.2
	14	21.3	202	0.810 ± 0.16	0.165	2.44	11.3
	15	70.7	178	0.355 ± 0.12	0.159	–3.15	12.0
	16	67.7	173	0.364 ± 0.12	0.159	0.936	11.8
	17	62.9	162	0.184 ± 0.11	0.157	4.88	11.7
	18	137	177	0.533 ± 0.14	0.159	4.37	11.1
	19	79.6	178	0.437 ± 0.13	0.159	7.07	11.0
	20	116	191	0.611 ± 0.15	0.163	0.492	11.4
	21	186	198	0.747 ± 0.16	0.164	3.12	11.0
	22	77.3	165	0.268 ± 0.12	0.159	0.921	11.3
	23	72.2	187	0.488 ± 0.14	0.162	11.4 ± 6.5	10.8
	24	111	174	0.312 ± 0.12	0.161	6.29	10.8
	25	98.1	186	0.603 ± 0.14	0.162	0.167	11.2
	26	145	219	0.770 ± 0.16	0.168	94.0 ± 8.4	11.0
	27	205	224	1.38 ± 0.19	0.169	62.5 ± 7.5	10.6
	28	96.6	192	1.42 ± 0.20	0.162	8.51	11.1
	29	52.9	196	0.614 ± 0.15	0.163	8.14	10.8
	30	20.2	191	0.191 ± 0.11	0.162	7.55	11.0
	31	20.1	176	0.172 ± 0.11	0.160	9.10	11.2
April	1	67.0	175	0.385 ± 0.13	0.160	8.95	10.9
	2	84.7	196	0.666 ± 0.15	0.164	9.73	10.8
	3	122	198	0.666 ± 0.15	0.164	5.33	11.0
	4	–55.9	198	0.833 ± 0.16	0.164	16.2 ± 6.5	10.7
	5	120	183	0.559 ± 0.14	0.160	5.62	10.7
	6	50.3	167	0.233 ± 0.11	0.158	6.14	11.1
	7	213 ± 98	189	2.85 ± 0.26	0.161	9.03	10.8
	8	62.9	185	0.640 ± 0.15	0.161	4.00	11.1
	9	3.05	210	6.03 ± 0.37	0.167	4.40	11.1
	10	70.3	193	0.773 ± 0.15	0.163	0.844	11.3
	11	22.1	184	0.677 ± 0.15	0.162	5.77	10.7
	12	61.1	182	0.603 ± 0.14	0.162	12.0 ± 6.6	11.2
	13	92.5	161	0.233 ± 0.11	0.159	5.88	10.6
	14	45.1	186	0.367 ± 0.12	0.162	2.63	11.1
	15	11.1	178	0.426 ± 0.13	0.161	5.07	10.8
	16	–215	174	3.85 ± 0.30	0.161	4.74	10.9

Table 6-1. Daily monitoring results for gross alpha, gross beta, and tritium in the sanitary sewer effluent, 1997 (continued).

Date		Gross alpha (μBq/mL)		Gross beta (mBq/mL)		Tritium (mBq/mL)	
		Activity(a)	LOS(b)	Activity(a)	LOS(b)	Activity(a)	LOS(b)
April	17	67.3	185	0.947 ± 0.17	0.162	6.73	11.0
	18	141	188	0.625 ± 0.14	0.162	220 ± 11	10.7
	19	28.3	178	0.548 ± 0.14	0.160	50.7 ± 7.6	11.0
	20	20.7	169	0.289 ± 0.12	0.159	6.55	11.0
	21	–32.3	172	0.340 ± 0.12	0.159	16.6 ± 6.5	10.4
	22	64.8	164	0.459 ± 0.13	0.158	5.22	11.0
	23	44.8	163	0.503 ± 0.14	0.158	2.70	11.0
	24	144	172	0.514 ± 0.13	0.159	7.36	11.0
	25	64.8	195	0.807 ± 0.16	0.163	4.14	11.2
	26	68.8	218	0.866 ± 0.16	0.167	3.21	11.1
	27	15.3	192	0.290 ± 0.12	0.162	12.5 ± 6.5	10.8
	28	36.1	205	0.511 ± 0.14	0.164	7.44	11.1
	29	–5.03	223	1.02 ± 0.17	0.168	10.2	10.7
	30	3.47	206	0.899 ± 0.17	0.165	7.66	10.7
May	1	–85.8	211	1.02 ± 0.17	0.166	7.73	11.0
	2	192	197	0.496 ± 0.14	0.164	3.06	10.9
	3	160	201	0.673 ± 0.15	0.165	–4.85	11.6
	4	78.4	178	0.259 ± 0.12	0.161	8.88	11.0
	5	148	170	0.152	0.160	9.77	11.4
	6	149	201	0.781 ± 0.16	0.165	–1.87	11.0
	7	25.0	195	0.696 ± 0.15	0.164	5.44	10.8
	8	36.4	175	0.529 ± 0.14	0.161	2.21	11.2
	9	–32.9	191	0.599 ± 0.14	0.163	6.88	10.8
	10	37.0	204	0.855 ± 0.16	0.165	6.81	11.0
	11	–41.1	183	0.307 ± 0.12	0.162	10.7	10.9
	12	81.8	170	0.198 ± 0.11	0.160	4.59	11.3
	13	65.9	188	0.685 ± 0.15	0.163	0.170	11.3
	14	–51.4	185	0.622 ± 0.14	0.162	3.15	11.0
	15	–5.85	170	0.496 ± 0.13	0.160	9.62	10.7
	16	19.7	169	0.374 ± 0.13	0.160	9.55	10.7
	17	33.2	187	0.629 ± 0.14	0.161	74.7 ± 8.2	11.0
	18	49.6	151	0.118	0.155	12.0 ± 6.7	11.2
	19	32.5	171	0.213 ± 0.11	0.159	14.0 ± 6.9	11.1
	20	–44.8	422	4.29 ± 0.47	0.333	8.95	10.7
	21	45.9	176	0.451 ± 0.13	0.159	0.836	10.8

Table 6-1. Daily monitoring results for gross alpha, gross beta, and tritium in the sanitary sewer effluent, 1997 (continued).

Date		Gross alpha (µBq/mL)		Gross beta (mBq/mL)		Tritium (mBq/mL)	
		Activity[a]	LOS[b]	Activity[a]	LOS[b]	Activity[a]	LOS[b]
May	22	75.5	189	0.747 ± 0.16	0.161	–2.63	11.4
	23	33.3	194	0.644 ± 0.15	0.162	7.59	10.9
	24	131	175	0.433 ± 0.13	0.161	16.8 ± 7.0	11.2
	25	185	187	0.325 ± 0.12	0.162	22.3 ± 7.1	11.2
	26	36.4	156	0.131	0.158	5.62	11.3
	27	6.77	168	0.144	0.160	3.92	10.8
	28	138	181	0.599 ± 0.14	0.161	5.96	11.5
	29	131	176	0.455 ± 0.13	0.161	17.6 ± 7.0	11.2
	30	–23.2	180	0.744 ± 0.16	0.162	1.19	11.2
	31	44.8	178	0.433 ± 0.13	0.162	3.06	11.1
June	1	–36.3	165	0.146	0.160	4.22	11.2
	2	–27.6	174	0.246 ± 0.12	0.161	10.7	11.0
	3	19.5	180	0.588 ± 0.14	0.162	–4.33	11.2
	4	55.1	169	0.488 ± 0.14	0.161	2.72	11.3
	5	175	186	0.622 ± 0.14	0.163	–0.766	11.2
	6	27.8	179	1.25 ± 0.19	0.159	5.25	11.0
	7	190 ± 120	180	0.655 ± 0.14	0.159	3.16	11.0
	8	155	161	0.192 ± 0.11	0.157	3.74	11.0
	9	42.6	149	0.245 ± 0.11	0.155	5.44	11.1
	10	56.2	146	0.227 ± 0.11	0.154	1.11	11.0
	11	–62.2	172	0.681 ± 0.15	0.159	5.22	10.9
	12	64.4	176	0.733 ± 0.15	0.159	8.18	11.0
	13	39.6	167	0.411 ± 0.13	0.160	3.23	10.9
	14	0.829	182	0.544 ± 0.14	0.162	7.59	10.7
	15	–17.5	160	0.335 ± 0.12	0.159	3.67	11.1
	16	–20.8	152	0.154	0.158	5.03	11.1
	17	18.4	167	0.507 ± 0.14	0.160	9.69	10.7
	18	–33.6	194	0.788 ± 0.16	0.164	85.5 ± 8.3	11.1
	19	31.2	186	0.707 ± 0.16	0.162	2.63	11.4
	20	–31.6	187	0.829 ± 0.16	0.162	–2.72	11.5
	21	5.99	193	0.807 ± 0.16	0.164	1.11	11.2
	22	6.85	174	0.359 ± 0.13	0.161	4.85	11.0
	23	123	166	0.256 ± 0.12	0.159	5.33	11.3
	24	258 ± 140	196	0.651 ± 0.15	0.164	0.170	11.1
	25	125	186	0.496 ± 0.13	0.162	0.592	10.8

Table 6-1. Daily monitoring results for gross alpha, gross beta, and tritium in the sanitary sewer effluent, 1997 (continued).

Date		Gross alpha (μBq/mL)		Gross beta (mBq/mL)		Tritium (mBq/mL)	
		Activity(a)	LOS(b)	Activity(a)	LOS(b)	Activity(a)	LOS(b)
June	26	27.2	182	0.392 ± 0.13	0.162	9.36	11.0
	27	60.7	183	0.662 ± 0.15	0.162	7.77	10.9
	28	–17.8	172	0.566 ± 0.14	0.160	0.251	11.1
	29	18.1	195	0.810 ± 0.16	0.164	2.97	11.2
	30	91.0	202	0.344 ± 0.12	0.165	4.33	11.1
July	1	171	280	0.596 ± 0.19	0.252	107 ± 9	10.8
	2	–20.4	217	0.710 ± 0.16	0.168	2.97	11.2
	3	74.7	198	0.688 ± 0.15	0.165	–0.766	11.1
	4	210	278	0.718 ± 0.17	0.177	–0.596	11.3
	5	–9.03	168	0.228 ± 0.11	0.160	6.70	11.2
	6	6.59	158	0.219 ± 0.11	0.159	7.18	11.3
	7	36.6	168	0.259 ± 0.12	0.160	9.25	11.0
	8	208 ± 130	183	0.651 ± 0.15	0.162	7.40	11.1
	9	71.8	213	0.836 ± 0.17	0.168	4.33	11.1
	10	181	223	0.485 ± 0.14	0.170	1.79	10.8
	11	148	188	0.555 ± 0.14	0.163	8.77	10.7
	12	44.8	172	0.474 ± 0.13	0.161	3.33	11.0
	13	79.2	157	0.152	0.158	–0.851	11.3
	14	17.6	153	0.180 ± 0.11	0.158	–0.847	11.3
	15	61.1	191	0.551 ± 0.14	0.163	14.4 ± 6.8	11.0
	16	5.18	184	0.574 ± 0.14	0.162	9.95	11.1
	17	–38.5	201	0.677 ± 0.16	0.168	2.72	11.2
	18	68.5	192	0.496 ± 0.14	0.166	3.23	11.2
	19	0.781	192	0.655 ± 0.15	0.166	1.88	10.8
	20	128	162	0.143	0.162	6.36	10.8
	21	–49.6	171	0.260 ± 0.12	0.163	2.04	11.2
	22	80.3	175	0.677 ± 0.15	0.164	5.51	11.0
	23	79.6	192	0.574 ± 0.14	0.166	–1.19	11.2
	24	19.6	182	0.625 ± 0.15	0.165	9.95	10.8
	25	29.4	203	0.918 ± 0.17	0.168	10.9	11.1
	26	111	219	0.759 ± 0.16	0.171	14.4 ± 6.6	10.8
	27	–13.2	201	0.369 ± 0.13	0.168	1.28	11.1
	28	40.0	181	0.154	0.164	13.6 ± 6.5	10.6
	29	2.35	218	0.818 ± 0.16	0.171	–0.0851	11.7
	30	72.5	267	0.784 ± 0.16	0.179	9.10	10.7
	31	2.75	181	0.440 ± 0.13	0.165	4.70	12.4

Table 6-1. Daily monitoring results for gross alpha, gross beta, and tritium in the sanitary sewer effluent, 1997 (continued).

Date		Gross alpha (μBq/mL)		Gross beta (mBq/mL)		Tritium (mBq/mL)	
		Activity(a)	LOS(b)	Activity(a)	LOS(b)	Activity(a)	LOS(b)
August	1	8.29	241	0.899 ± 0.17	0.177	4.26	11.7
	2	109	201	0.981 ± 0.18	0.168	4.18	11.6
	3	110	185	0.181 ± 0.11	0.165	3.89	11.5
	4	44.8	175	0.309 ± 0.12	0.164	0.766	11.2
	5	154	208	0.962 ± 0.17	0.169	–2.46	11.6
	6	–0.907	227	0.644 ± 0.15	0.171	3.21	11.2
	7	48.1	205	1.04 ± 0.18	0.166	–1.87	11.5
	8	474 ± 180	211	1.78 ± 0.21	0.167	4.51	10.9
	9	246 ± 150	218	0.888 ± 0.17	0.168	13.7 ± 6.6	10.7
	10	56.6	194	0.293 ± 0.12	0.164	8.33	10.9
	11	208 ± 130	186	0.625 ± 0.14	0.163	5.85	11.2
	12	–39.2	214	0.895 ± 0.17	0.168	18.1 ± 7.1	11.3
	13	27.8	149	0.566 ± 0.14	0.159	9.77	11.4
	14	65.1	163	0.585 ± 0.14	0.162	1.54	11.1
	15	82.9	141	0.270 ± 0.11	0.157	0.511	11.4
	16	12.4	172	0.607 ± 0.15	0.164	9.36	11.0
	17	51.4	170	0.130	0.164	9.03	10.9
	18	12.1	182	0.208 ± 0.11	0.167	10.5	10.5
	19	79.2	185	0.932 ± 0.17	0.168	8.18	11.0
	20	87.3	168	0.551 ± 0.14	0.163	7.77	11.1
	21	73.3	198	0.341 ± 0.13	0.166	7.66	11.4
	22	–33.2	201	0.544 ± 0.14	0.167	7.44	11.0
	23	58.8	200	0.570 ± 0.14	0.167	5.62	11.3
	24	107	184	0.258 ± 0.12	0.164	6.81	11.0
	25	–10.4	189	0.205 ± 0.11	0.165	8.44	11.2
	26	–68.1	215	0.725 ± 0.16	0.169	–17.5	12.7
	27	–74.0	212	0.540 ± 0.15	0.169	4.85	12.1
	28	106	200	0.736 ± 0.15	0.167	2.70	11.8
	29	1.76	207	0.644 ± 0.15	0.168	7.77	12.1
	30	72.2	209	0.518 ± 0.14	0.169	–12.7	12.5
	31	–48.5	205	0.142	0.168	–1.99	13.2
September	1	–42.2	215	0.265 ± 0.12	0.170	6.55	12.4
	2	–68.8	197	0.186 ± 0.11	0.167	6.14	12.4
	3	79.2	189	0.566 ± 0.14	0.166	2.97	12.7
	4	79.2	186	0.529 ± 0.14	0.165	–12.8	14.8

Table 6-1. Daily monitoring results for gross alpha, gross beta, and tritium in the sanitary sewer effluent, 1997 (continued).

Date		Gross alpha (μBq/mL)		Gross beta (mBq/mL)		Tritium (mBq/mL)	
		Activity[a]	LOS[b]	Activity[a]	LOS[b]	Activity[a]	LOS[b]
September	5	–11.1	232	0.585 ± 0.15	0.174	12.5	14.9
	6	72.5	197	0.411 ± 0.13	0.167	718 ± 18	14.9
	7	–39.2	168	0.215 ± 0.11	0.163	–12.9	15.1
	8	20.4	179	0.311 ± 0.12	0.164	–0.492	13.5
	9	98.4	196	0.603 ± 0.14	0.167	–22.8	15.8
	10	–41.1	182	1.52 ± 0.20	0.165	21.2 ± 7.4	12.0
	11	40.7	180	0.611 ± 0.15	0.165	9.18	11.8
	12	194 ± 130	189	0.414 ± 0.13	0.167	6.36	12.0
	13	193	214	1.64 ± 0.21	0.171	9.77	14.1
	14	45.1	159	0.389 ± 0.13	0.162	17.2 ± 8.3	13.8
	15	38.5	155	0.173 ± 0.11	0.161	6.25	13.9
	16	–15.3	204	0.685 ± 0.16	0.168	–1.88	12.2
	17	53.7	192	0.500 ± 0.14	0.165	0.770	11.7
	18	17.1	178	0.703 ± 0.15	0.163	3.40	11.5
	19	214 ± 130	201	0.629 ± 0.15	0.167	–3.66	12.0
	20	–6.36	189	0.570 ± 0.14	0.165	5.03	11.8
	21	–5.40	151	0.117	0.159	5.18	11.5
	22	77.7	270	0.514 ± 0.15	0.178	5.62	11.8
	23	46.6	185	0.555 ± 0.14	0.164	–0.255	11.9
	24	216	275	0.370 ± 0.21	0.311	–6.03	12.6
	25	116	142	0.343 ± 0.12	0.156	3.57	11.7
	26	152	194	0.681 ± 0.16	0.168	3.92	12.5
	27	17.5	142	0.433 ± 0.13	0.156	12.3 ± 6.7	12.0
	28	17.5	112	0.140	0.150	6.96	12.5
	29	34.4	108	0.0307	0.148	9.36	12.1
	30	120	158	0.477 ± 0.13	0.159	14.5 ± 7.0	11.9
October	1	167	181	0.840 ± 0.16	0.165	6.99	12.8
	2	18.4	195	0.444 ± 0.14	0.171	15.5 ± 6.8	11.0
	3	89.9	183	0.374 ± 0.13	0.169	4.81	11.8
	4	142	195	0.525 ± 0.14	0.171	18.6 ± 7.6	12.2
	5	46.3	164	0.111	0.167	12.0 ± 6.7	11.6
	6	–6.36	178	0.229 ± 0.12	0.168	10.9	11.6
	7	–1.88	195	0.481 ± 0.14	0.171	3.85	11.5
	8	64.0	225	1.17 ± 0.19	0.178	–6.66	13.1
	9	124	205	0.829 ± 0.17	0.176	4.51	11.8

Table 6-1. Daily monitoring results for gross alpha, gross beta, and tritium in the sanitary sewer effluent, 1997 (continued).

Date		Gross alpha (μBq/mL)		Gross beta (mBq/mL)		Tritium (mBq/mL)	
		Activity[(a)]	LOS[(b)]	Activity[(a)]	LOS[(b)]	Activity[(a)]	LOS[(b)]
October	10	92.5	182	1.38 ± 0.18	0.180	–0.341	12.4
	11	33.4	172	0.525 ± 0.14	0.170	3.09	12.1
	12	84.4	159	0.282 ± 0.12	0.168	7.22	11.6
	13	61.1	174	0.670 ± 0.15	0.170	10.5	11.3
	14	15.7	175	0.574 ± 0.15	0.171	2.80	11.4
	15	102	201	0.851 ± 0.17	0.175	2.22	11.1
	16	50.0	228	0.892 ± 0.18	0.181	0.00733	11.2
	17	–39.6	188	0.655 ± 0.15	0.172	4.26	10.9
	18	89.5	197	0.640 ± 0.15	0.174	–1.27	11.2
	19	78.8	175	0.231 ± 0.12	0.171	–1.14	11.2
	20	10.8	167	0.258 ± 0.12	0.169	–2.06	11.2
	21	–41.4	213	0.921 ± 0.18	0.176	–3.50	11.1
	22	45.1	192	0.696 ± 0.15	0.172	1.41	11.4
	23	201 ± 130	196	0.944 ± 0.17	0.173	–4.33	11.7
	24	188	191	0.736 ± 0.15	0.172	8.77	10.8
	25	164	184	0.692 ± 0.15	0.171	0.581	11.3
	26	57.4	194	0.455 ± 0.14	0.172	9.92	10.8
	27	101	171	0.389 ± 0.13	0.169	6.59	11.1
	28	42.2	186	0.725 ± 0.16	0.171	1.68	11.2
	29	225 ± 140	194	0.773 ± 0.16	0.172	–8.58	11.6
	30	105	195	1.01 ± 0.17	0.173	1.85	11.4
	31	–28.5	183	0.736 ± 0.15	0.171	11.3 ± 5.7	9.18
November	1	55.5	88.8	0.588 ± 0.082	0.0881	5.03	11.3
	2	6.14	54.0	0.0270	0.0796	–1.62	11.7
	3	21.3	58.8	0.135 ± 0.057	0.0807	0.339	11.7
	4	111 ± 47	71.4	0.751 ± 0.083	0.0833	8.99	11.6
	5	57.0	69.6	0.651 ± 0.085	0.0829	–6.07	11.8
	6	36.1	73.6	0.636 ± 0.083	0.0836	5.00	11.6
	7	42.9	71.4	0.585 ± 0.082	0.0833	5.92	11.8
	8	117 ± 51	78.4	0.681 ± 0.082	0.0851	–2.73	11.7
	9	40.7	57.7	0.213 ± 0.062	0.0803	1.20	11.4
	10	137 ± 57	70.7	0.310 ± 0.068	0.0833	–1.27	11.4
	11	158 ± 61	95.8	0.988 ± 0.098	0.0910	19.6 ± 6.3	11.6
	12	25.6	92.5	0.655 ± 0.085	0.0903	4.18	11.0

Table 6-1. Daily monitoring results for gross alpha, gross beta, and tritium in the sanitary sewer effluent, 1997 (continued).

Date		Gross alpha (μBq/mL)		Gross beta (mBq/mL)		Tritium (mBq/mL)	
		Activity[a]	LOS[b]	Activity[a]	LOS[b]	Activity[a]	LOS[b]
November	13	71.4	92.1	0.969 ± 0.097	0.0903	–0.792	11.6
	14	3.42	89.2	0.836 ± 0.092	0.0899	–2.30	11.9
	15	25.6	96.2	0.770 ± 0.092	0.0914	–1.11	11.3
	16	28.7	81.4	0.352 ± 0.074	0.0884	6.62	11.2
	17	31.7	79.2	0.281 ± 0.067	0.0881	3.44	11.6
	18	–17.9	95.5	0.925 ± 0.093	0.0910	1.79	11.4
	19	43.3	130	1.00 ± 0.10	0.0973	–3.74	11.7
	20	–61.8	103	0.947 ± 0.095	0.0929	–2.56	11.7
	21	21.1	100	1.04 ± 0.10	0.0921	1.55	11.7
	22	–3.70	104	1.08 ± 0.10	0.0932	7.33	11.5
	23	–0.729	82.9	0.544 ± 0.082	0.0888	1.25	11.5
	24	40.3	80.3	0.389 ± 0.074	0.0884	–0.673	11.5
	25	140 ± 64	89.9	0.692 ± 0.090	0.0907	–2.46	11.5
	26	24.5	88.4	0.356 ± 0.075	0.0903	9.32	11.0
	27	44.0	86.6	0.514 ± 0.082	0.0899	0.0955	11.6
	28	29.7	84.0	0.150 ± 0.063	0.0895	6.96	11.4
	29	43.7	75.9	0.178 ± 0.064	0.0881	5.70	11.3
	30	73.6	92.5	0.381 ± 0.076	0.0910	7.99	11.5
December	1	138 ± 69	93.6	0.451 ± 0.077	0.0910	6.59	11.4
	2	159 ± 67	101	0.918 ± 0.092	0.0921	–1.37	11.4
	3	0.303	94.4	0.618 ± 0.087	0.0914	3.12	11.0
	4	67.7	88.4	0.766 ± 0.092	0.0903	4.18	11.0
	5	70.3	87.3	0.503 ± 0.081	0.0899	–0.507	11.2
	6	64.0	95.8	0.722 ± 0.087	0.0918	6.44	10.8
	7	–22.3	75.9	0.156 ± 0.064	0.0881	9.81	10.8
	8	24.9	83.3	0.294 ± 0.071	0.0895	8.07	10.8
	9	62.5	80.3	0.263 ± 0.068	0.0884	–4.00	11.5
	10	112 ± 57	92.1	0.622 ± 0.087	0.0903	3.74	10.6
	11	169	223	0.733 ± 0.15	0.193	–0.344	11.2
	12	31.6	133	1.05 ± 0.11	0.0988	–2.01	11.1
	13	103	104	0.699 ± 0.091	0.0944	4.33	10.8
	14[c]	42.6	95.5	0.629 ± 0.088	0.0910	1.62	10.8
	15[c]	42.6	95.5	0.629 ± 0.088	0.0910	1.62	10.8
	16	–3.74	93.6	0.459 ± 0.078	0.0907	6.48	10.4
	17	299 ± 93	102	1.01 ± 0.10	0.0940	–4.18	11.0

Table 6-1. Daily monitoring results for gross alpha, gross beta, and tritium in the sanitary sewer effluent, 1997 (concluded).

Date		Gross alpha (μBq/mL)		Gross beta (mBq/mL)		Tritium (mBq/mL)	
		Activity[a]	LOS[b]	Activity[a]	LOS[b]	Activity[a]	LOS[b]
December	18	46.3	94.0	0.599 ± 0.084	0.0921	74.7 ± 8.2	11.1
	19	115 ± 65	103	0.810 ± 0.097	0.0940	1.04	11.4
	20	70.7	102	0.707 ± 0.092	0.0936	4.66	11.1
	21	–25.9	91.4	0.302 ± 0.072	0.0914	5.18	10.8
	22	19.4	92.1	0.232 ± 0.070	0.0918	–0.855	11.2
	23	34.7	86.6	0.514 ± 0.082	0.0907	2.63	11.4
	24	72.5	94.0	0.633 ± 0.089	0.0921	–1.19	11.4
	25	74.7	98.1	0.670 ± 0.087	0.0929	–1.53	11.8
	26	41.1	83.6	0.269 ± 0.070	0.0903	–3.74	11.6
	27	37.0	85.5	0.259 ± 0.070	0.0903	2.64	11.4
	28	–0.855	79.6	0.192 ± 0.065	0.0895	3.81	10.6
	29	22.3	83.3	0.233 ± 0.068	0.0903	3.19	10.8
	30	57.7	114	0.759 ± 0.091	0.0969	–4.85	11.3
	31	40.0	88.4	0.807 ± 0.089	0.0910	–3.22	11.5

Note: Dates for which the daily monitoring results are not available have been footnoted. The results shown for these dates are the monitoring results for the corresponding weekly composite sample. The footnote explanation shows the sampling period for the weekly composite sample.

a The activities shown in this table are reported concentrations and their associated 2σ counting errors. Activities shown do not include the 2σ counting errors when the reported concentrations are below the limit of sensitivity.

b LOS = limit of sensitivity.

c December 9–15, 1997.

Table 6-2. Weekly composite results for metals in LLNL sanitary sewer effluent, 1997.

Composite dates	Parameter (mg/L)											
	Ag	Al	As	Be	Cd	Cr	Cu	Fe	Hg	Ni	Pb	Zn
12/31/96–1/6/97	<0.010	0.42	<0.0020	<0.0005	<0.005	0.018	0.16	1.4	0.0016	0.0055	0.049	0.28
1/8–13[a]	<0.010	0.30	0.0027	<0.0005	<0.005	0.019	0.11	1.1	0.00066	<0.005	0.013	0.28
1/14–20	<0.010	<0.20	<0.0020	<0.0005	<0.005	<0.010	0.062	0.68	0.00022	0.0066	0.010	0.18
1/21–27	<0.010	0.25	0.0066	<0.0005	<0.005	0.020	0.069	0.9	<0.0002	<0.005	<0.002	0.17
1/28–2/3	<0.010	0.38	0.0030	<0.0005	<0.005	0.013	0.11	1.0	0.00054	<0.005	0.013	0.21
2/4–5,7–10[a]	<0.010	0.36	<0.0020	<0.0005	<0.005	0.016	0.12	1.9	0.00029	0.010	0.014	0.29
2/11–17	0.038	0.54	<0.0020	<0.0005	<0.005	<0.010	0.09	1.3	0.00035	0.0056	0.010	0.23
2/18–24	0.032	0.43	<0.0020	<0.0005	<0.005	0.017	0.093	1.3	0.00054	0.010	0.011	0.25
2/25–3/3	0.023	0.44	<0.0020	<0.0005	<0.005	0.027	0.099	1.3	0.0028	0.064	0.024	0.24
3/4–5,7–10[a]	<0.010	0.46	<0.0020	<0.0005	<0.005	<0.010	0.088	2.1	0.0019	0.032	0.018	0.23
3/11–17	0.010	0.43	0.026	<0.0005	<0.005	0.018	0.096	1.3	0.0013	0.027	0.012	0.23
3/18–24	<0.010	0.43	0.012	<0.0005	<0.005	0.018	0.14	1.2	0.00035	0.019	<0.002	0.27
3/25–31	0.034	0.75	<0.0020	<0.0005	<0.005	0.027	0.15	2.9	0.00033	0.014	0.027	0.35
4/1–2, 4–7[a]	0.043	0.95	<0.0020	<0.0005	<0.005	0.035	0.19	4.3	0.0046	0.013	0.057	0.52
4/8–14	0.017	0.62	0.0025	<0.0005	<0.005	0.021	0.11	1.6	0.0016	0.0092	<0.002	0.20
4/15–21	0.020	1.2	<0.0020	<0.0005	<0.005	0.048	0.19	3.2	0.00061	0.0089	0.040	0.36
4/22–28	<0.010	1.1	<0.0020	<0.0005	<0.005	<0.010	0.16	3.4	0.0011	0.0058	0.016	0.35
4/29–5/5	0.037	1.2	<0.0020	<0.0005	<0.005	0.042	0.19	3.6	0.00045	0.0058	0.003	0.48
5/6–12	0.016	0.54	0.0041	<0.0005	<0.005	0.018	0.11	1.9	0.00050	0.014	0.022	0.23
5/13–19	<0.010	0.48	<0.0020	<0.0005	<0.005	0.033	0.12	1.6	0.00033	<0.005	0.031	0.29
5/20–26	0.015	0.72	<0.0020	<0.0005	0.0058	0.019	0.15	2.3	0.00094	0.0060	0.020	0.29
5/27–6/2	0.017	1.1	0.0038	<0.0005	<0.005	0.038	0.32	3.3	0.0010	0.020	0.073	0.50
6/3–9	0.011	0.56	0.0023	<0.0005	<0.005	<0.010	0.14	1.7	0.00048	0.011	0.054	0.32
6/10–16	0.016	0.56	0.0037	<0.0005	<0.005	0.021	0.14	1.8	0.00081	0.017	0.042	0.35
6/17–23	<0.010	0.35	0.0033	<0.0005	<0.005	<0.010	0.082	1.2	0.00073	0.010	0.027	0.16
6/24–30	0.016	0.81	0.0043	<0.0005	<0.005	0.018	0.24	2.4	0.0029	0.025	0.022	0.35
7/1–7	0.043	0.70	0.0029	<0.0005	<0.005	0.031	0.25	2.3	0.017[b]	0.010	0.028	0.36
7/8–14	<0.010	0.43	<0.0020	<0.0005	<0.005	0.012	0.095	1.2	0.0018	<0.005	0.018	0.21

Table 6-2. Weekly composite results for metals in LLNL sanitary sewer effluent, 1997 (continued).

Composite dates	Parameter (mg/L)											
	Ag	Al	As	Be	Cd	Cr	Cu	Fe	Hg	Ni	Pb	Zn
7/15–21	0.014	0.36	<0.0020	<0.0005	<0.005	0.011	0.12	0.82	0.0010	0.0064	0.026	0.20
7/22–28	<0.010	0.72	0.0029	<0.0005	<0.005	0.012	0.16	1.4	0.00077	0.0070	0.028	0.26
7/29–8/4	<0.010	0.38	0.0020	<0.0005	<0.005	<0.010	0.032	1.0	<0.0002	0.0062	0.020	0.37
8/5–11	<0.010	0.78	0.0023	<0.0005	<0.005	0.013	0.13	2.5	<0.0002	0.012	0.054	0.67
8/12–18	0.011	0.78	0.0035	<0.0005	<0.005	0.020	0.26	2.3	0.0016	0.012	0.047	0.65
8/19–25	<0.010	0.47	<0.0020	<0.0005	<0.005	<0.010	0.17	1.0	0.00087	<0.005	0.049	0.38
8/26–9/1	<0.010	0.43	<0.0020	<0.0005	<0.005	<0.010	0.11	1.1	0.00028	<0.005	0.033	0.26
9/2–8	<0.010	0.55	0.0024	<0.0005	<0.005	<0.010	0.070	1.3	0.00030	0.0082	0.068	0.42
9/9–15	<0.010	1.0	<0.0020	<0.0005	0.0089	0.026	0.21	2.1	0.00083	0.0073	0.058	0.47
9/16–22	<0.010	0.47	0.0045	<0.0005	<0.005	0.013	0.11	1.3	<0.0002	<0.005	0.021	0.27
9/23–29	<0.010	0.73	0.0025	<0.0005	<0.005	0.014	0.15	1.6	0.0036	0.0059	0.029	0.34
9/30–10/6	<0.010	0.60	0.0072	<0.0005	<0.005	<0.010	0.10	0.89	<0.0002	<0.005	0.031	0.40
10/7–13	<0.010	0.52	0.0042	<0.0005	<0.005	0.016	0.13	1.2	0.00042	<0.005	<0.002	0.26
10/14–20	<0.010	0.64	0.0021	<0.0005	<0.005	0.018	0.13	1.4	0.00029	<0.005	0.013	0.34
10/21–27	0.0056	0.76	0.0050	<0.0005	<0.005	0.030	0.14	2.0	0.0018	0.0089	0.031	0.31
10/28–11/3	<0.010	0.69	0.0031	<0.0005	<0.005	0.010	0.15	1.7	0.00052	0.0064	0.18[(b)]	0.31
11/4–10	<0.010	0.56	0.0028	<0.0005	<0.005	<0.010	0.18	1.5	0.00040	<0.005	0.060	0.48
11/11–17	<0.010	0.37	0.0054	<0.0005	<0.005	<0.010	0.12	1.3	0.0018	0.0063	0.031	0.35
11/18–24	<0.010	0.67	0.0034	<0.0005	<0.005	0.030	0.14	2.2	0.00064	0.0060	0.022	0.37
11/25–12/1	<0.010	0.68	0.0081	<0.0005	<0.005	0.024	0.12	1.4	0.00057	0.0074	0.019	0.31
12/2–8	<0.010	1.2	0.0060	<0.0005	<0.005	0.020	0.15	2.8	0.0011	0.012	0.028	0.50
12/9–15	<0.010	0.55	0.0066	<0.0005	<0.005	<0.010	0.095	1.1	0.00054	0.0076	0.014	0.22
12/16–22	<0.010	0.71	0.0040	<0.0005	<0.005	0.021	0.11	1.9	0.00078	0.0081	0.023	0.25
12/23–29	<0.010	0.83	0.0020	<0.0005	<0.005	0.019	0.13	3.3	0.00044	0.0074	0.071	0.35
12/30–1/5	<0.010	0.34	0.0051	<0.0005	<0.005	0.013	0.076	1.7	<0.0002	0.0084	0.022	0.23

Table 6-2. Weekly composite results for metals in LLNL sanitary sewer effluent, 1997 (concluded).

	Parameter (mg/L)											
	Ag	**Al**	**As**	**Be**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Ni**	**Pb**	**Zn**
Summary of weekly composite results												
Detection frequency	19/53	52/53	33/53	0/53	2/53	39/53	53/53	53/53	47/53	41/53	49/53	53/53
Minimum (mg/L)	0.006	<0.2	<0.002	0.0002	0.002	<0.010	0.032	0.68	<0.0002	<0.005	<0.002	0.16
Maximum (mg/L)	0.043	1.2	0.026	<0.0005	0.009	0.048	0.32	4.3	0.017(b)	0.064	0.18(b)	0.67
Median (mg/L)	<0.010	0.56	0.003	<0.0005	<0.005	0.018	0.13	1.6	0.0006	0.007	0.024	0.31
IQR(c) (mg/L)	—	0.30	0.002	—	—	0.011	0.05	1.0	0.0008	0.005	0.026	0.12
50% of EPL(d) (mg/L)	0.1	—	0.03	—	0.07	0.31	0.5	—	0.005	0.31	0.1	1.5
Maximum/50% of EPL	0.43	—	0.87	—	0.13	0.15	0.64	—	3.4	0.21	1.8	0.45
Median/50% of EPL	0.10	—	0.10	—	0.071	0.058	0.26	—	0.12	0.024	0.24	0.21

a Sampling for this week omitted one day because the sampling equipment was devoted to the acquisition of the monthly composite sample. See Table 6-3 for the monthly composite results.

b Result is discussed in main volume, Chapter 6.

c Interquartile range.

d Effluent pollutant limit (LLNL Wastewater Discharge Permit).

Table 6-3. Monthly 24-hour composite results for metals in LLNL sanitary sewer effluent, 1997.

Composite dates	Parameter (mg/L)											
	Ag	Al	As	Be	Cd	Cr	Cu	Fe	Hg	Ni	Pb	Zn
1/7	0.010	0.38	<0.002	<0.0005	<0.005	0.012	0.10	1.2	0.0011	<0.005	0.017	0.24
2/6	0.061	<0.2	<0.002	<0.0005	0.0051	0.010	0.059	0.60	0.00032	<0.005	<0.002	0.12
3/6	0.023	0.50	<0.002	<0.0005	<0.005	0.017	0.087	7.8	0.00069	<0.005	0.016	0.21
4/3	0.011	0.46	<0.002	<0.0005	<0.005	0.020	0.082	1.7	0.00023	0.0096	0.021	0.23
5/7	0.016	0.36	0.0023	<0.0005	<0.005	0.014	0.080	1.5	<0.0002	0.0070	0.010	0.17
6/5	0.011	0.88	0.0032	<0.0005	<0.005	<0.01	0.11	1.8	0.00072	<0.005	0.026	0.24
7/2	0.024	0.47	0.0043	<0.0005	<0.005	0.019	0.084	1.3	0.00035	0.015	0.011	0.20
8/5	<0.01	0.41	0.0044	<0.0005	<0.005	<0.01	0.051	2.3	<0.0002	0.0061	0.017	0.30
9/4	<0.01	0.37	<0.002	<0.0005	<0.005	0.016	0.10	0.84	0.00027	<0.005	0.029	0.18
10/2	<0.01	0.40	0.0020	<0.0005	<0.005	0.012	0.11	0.96	<0.0002	<0.005	0.026	0.20
11/4	<0.01	0.42	0.0024	<0.0005	<0.005	<0.01	0.088	1.1	0.00027	<0.005	0.050	0.17
12/3	<0.01	0.51	0.0020	<0.0005	<0.005	<0.01	0.092	1.6	<0.0002	<0.005	0.013	0.28
	Summary of 24-hour composite results											
Detection frequency	7/12	11/12	7/12	0/12	1/12	8/12	12/12	12/12	8/12	4/12	11/12	12/12
Minimum (mg/L)	<0.01	<0.2	<0.002	<0.0005	<0.005	<0.01	0.051	0.60	<0.0002	<0.005	0.0020	0.12
Maximum (mg/L)	0.061	0.88	0.0044	<0.0005	0.0051	0.020	0.11	7.8	0.0011	0.015	0.05	0.30
Median (mg/L)	0.011	0.42	0.0020	<0.0005	0.0050	0.012	0.088	1.4	0.00027	<0.005	0.017	0.21
IQR[a] (mg/L)	—	0.10	—	—	—	0.0063	0.019	0.7	0.00021	—	0.014	0.063
EPL[b] (mg/L)	0.20	—	0.060	—	0.14	0.62	1.0	---	0.010	0.61	0.20	3.0
Maximum/EPL	0.31	—	0.073	—	0.036	0.032	0.11	---	0.11	0.025	0.25	0.10
Median/EPL	0.053	—	0.033	—	0.036	0.019	0.088	---	0.027	0.0082	0.085	0.068

[a] Interquartile range.

[b] Effluent pollutant limit (LLNL Wastewater Discharge Permit).

Table 6-4. Monthly monitoring results for physical and chemical characteristics of the LLNL sanitary sewer effluent, 1997.

Parameter	Sample month					
	January	February	March	April	May	June
Composite sample						
Oxygen demand (mg/L)						
Biochemical oxygen demand – 405.1	230	170	370	430	330	240
Chemical oxygen demand – 410.4	230	160	230	360	420	220
Solids (mg/L)						
Solid settling rate (mL/L/h) – 160.5	19	21	25	38	20	27
Total dissolved solids (TDS) – 160.1	330	400	250	270	250	250
Total suspended solids (TSS) – 160.2	200	150	300	340	310	290
Volatile solids – 160.4	190	140	250	300	280	250
Anions (mg/L) – 300.0						
Bromide	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloride	63	71	54	54	42	46
Fluoride	0.096	0.13	0.075	0.054	0.1	0.077
Nitrate (as N)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrate (as NO_3)	<0.5	1.1	<0.5	<0.5	0.91	<0.5
Nitrite (as N)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrite (as NO_2)	0.53	0.78	<0.5	0.8	<0.5	<0.5
Orthophosphate	13	14	22	15	12	20
Sulfate	45	65	26	21	30	15
Alkalinity (mg/L) – 310.1						
Bicarbonate alkalinity (as $CaCO_3$)	210	200	230	200	160	180
Carbonate alkalinity (as $CaCO_3$)	<1	<1	<1	<1	<1	<1
Hydroxide alkalinity (as $CaCO_3$)	<1	<1	<1	<1	<1	<1
Total alkalinity (as $CaCO_3$)	210	200	230	200	160	180
Nutrients (mg/L)						
Ammonia nitrogen (as N) – 350.2	54	36	72	82	35	51
Total Kjeldahl nitrogen – 351.3	52	39	86	110	31	18
Total organic carbon (mg/L) – 415.1						
Total organic carbon (TOC)	110	35	81	78	38	91

Table 6-4. Monthly monitoring results for physical and chemical characteristics of the LLNL sanitary sewer effluent, 1997 (continued).

Parameter	Sample month					
	July	August	September	October	November	December
Composite sample (continued)						
Oxygen demand (mg/L)						
Biochemical oxygen demand – 405.1	330	730	290	260	220	510
Chemical oxygen demand – 410.4	110	790	110	410	240	630
Solids (mg/L)						
Solid settling rate (mL/L/h) – 160.5	19	35	27	20	8	70
Total dissolved solids (TDS) – 160.1	260	210	130	230	240	470
Total suspended solids (TSS) – 160.2	520	330	220	250	140	380
Volatile solids – 160.4	470	290	200	230	120	360
Anions (mg/L) – 300.0						
Bromide	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloride	49	43	45	50	41	47
Fluoride	0.13	0.12	0.12	0.14	0.16	0.13
Nitrate (as N)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrate (as NO_3)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrite (as N)	<0.5	<0.5	<5	<0.5	<0.5	<0.5
Nitrite (as NO_2)	<0.5	<0.5	<5	0.54	<0.5	<0.5
Orthophosphate	20	2.3	12	5.4	5.7	16
Sulfate	17	15	15	16	12	17
Alkalinity (mg/L) – 310.1						
Bicarbonate alkalinity (as $CaCO_3$)	190	180	160	180	190	210
Carbonate alkalinity (as $CaCO_3$)	<1	<1	<1	<1	<1	<1
Hydroxide alkalinity (as $CaCO_3$)	<1	<1	<1	<1	<1	<1
Total alkalinity (as $CaCO_3$)	190	180	160	180	190	210
Nutrients (mg/L)						
Ammonia nitrogen (as N) – 350.2	36	42	47	44	48	58
Total Kjeldahl nitrogen – 351.3	49	37	67	45	39	7.6
Total organic carbon (mg/L) – 415.1						
Total organic carbon (TOC)	41	48	74	59	31	64

Table 6-4. Monthly monitoring results for physical and chemical characteristics of the LLNL sanitary sewer effluent, 1997 (continued).

Parameter	Sample month					
	January	February	March	April	May	June
Composite sample (continued)						
Polychlorinated biphenyls (μg/L) – 608						
PCB 1016	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB 1221	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB 1232	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB 1242	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB 1248	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB 1254	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB 1260	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organochlorine pesticides (μg/L) – 608						
Aldrin	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorocyclohexane (BHC)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BHC, ß isomer	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BHC, δ isomer	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BHC, γ isomer (Lindane)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlordane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan II	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulfate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin aldehyde	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachlorodiphenylethane (p,p'-DDD)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorodiphenyl trichloroethane (p,p'-DDE)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tetrachlorodiphenylethane (p,p'-DDT)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toxaphene	<1	<1	<1	<1	<1	<1
Total metals (mg/L)[(c)]						
Calcium – 200.7	22	17	15	16	16	14
Magnesium – 200.7	6.4	6.9	3.2	3.9	3.6	3.4
Potassium – 200.7	19	16	22	17	14	18
Selenium – 270.2	<0.002	0.0028	<0.002	<0.002	<0.002	<0.002
Sodium – 200.7	50	57	40	35	31	31
Total tributyltin (ng/L)	—[(d)]	—[(d)]	—[(d)]	—[(d)]	—[(d)]	—[(d)]

Table 6-4. Monthly monitoring results for physical and chemical characteristics of the LLNL sanitary sewer effluent, 1997 (continued).

Parameter	Sample month					
	July	August	September	October	November	December
Composite sample (continued)						
Polychlorinated biphenyls (μg/L) – 608						
PCB 1016	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB 1221	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB 1232	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB 1242	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB 1248	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB 1254	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCB 1260	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organochlorine pesticides (μg/L) – 608						
Aldrin	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorocyclohexane (BHC)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BHC, ß isomer	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BHC, δ isomer	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BHC, γ isomer (Lindane)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlordane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan II	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulfate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin aldehyde	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachlorodiphenylethane (p,p'-DDD)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorodiphenyl trichloroethane (p,p'-DDE)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tetrachlorodiphenylethane (p,p'-DDT)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toxaphene	<1	<1	<1	<1	<1	<1
Total metals (mg/L)[(c)]						
Calcium – 200.7	15	16	13	18	12	17
Magnesium – 200.7	3.7	3.1	3.5	3.3	2.4	3.8
Potassium – 200.7	15	16	15	16	18	21
Selenium – 270.2	<0.002	<0.002	<0.002	<0.002	<0.002	0.0037
Sodium – 200.7	32	29	26	33	34	33
Total tributyltin (ng/L	—[(d)]	—[(d)]	160	530	59	56

Table 6-4. Monthly monitoring results for physical and chemical characteristics of the LLNL sanitary sewer effluent, 1997 (continued).

Parameter	Sample month					
	January	February	March	April	May	June
Grab sample						
Volatile organic compounds (µg/L) – 624						
1,1,1-Trichloroethane	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1	<1	<1	<1
1,2-Dichloroethene (total)	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1	<1
2-Butanone	<40	<40	<40	<40	<40	<40
2-Chloroethylvinylether	<40	<40	<40	<40	<40	<40
2-Hexanone	<10	<10	<10	<10	<10	<10
4-Methyl-2-pentanone	<10	<10	<10	<10	<10	<10
Acetone	<40	96	<40	<40	400	60
Benzene	<1	<1	<1	<1	<1	<1
Bromodichloromethane	1.3	2.6	<1	<1	<1	<1
Bromoform	<1	<1	<1	<1	<1	<1
Bromomethane	<2	<2	<2	<2	<2	<2
Carbon disulfide	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	<1	<1	<1	<1	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1	<1
Chloroethane	<2	<2	<2	<2	<2	<2
Chloroform	4.2	3.6	16	10	11	11
Chloromethane	<2	<2	<2	<2	<2	<2
cis-1,3-Dichloropropene	<1	<1	<1	<1	<1	<1
Dibromochloromethane	<1	<1	<1	<1	<1	<1
Dibromomethane	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2
Ethylbenzene	<1	<1	<1	<1	<1	<1
Freon 113	<1	<1	<1	<1	<1	<1
Methylene chloride	<1	<1	<1	<1	<1	<1
Styrene	<1	<1	<1	<1	<1	<1

Table 6-4. Monthly monitoring results for physical and chemical characteristics of the LLNL sanitary sewer effluent, 1997 (continued).

Parameter	Sample month					
	July	August	September	October	November	December
Grab sample (continued)						
Volatile organic compounds (µg/L) – 624						
1,1,1-Trichloroethane	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1	<1	<1	<1
1,2-Dichloroethene (total)	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1	<1
2-Butanone	<40	<40	<40	<60	<40	<40
2-Chloroethylvinylether	<40	<40	<40	<40	<40	<40
2-Hexanone	<10	<10	<10	<10	<10	<10
4-Methyl-2-pentanone	<10	<10	<10	<10	<10	<10
Acetone	76	160	110	220	150	170
Benzene	<1	<1	<1	<1	<1	<1
Bromodichloromethane	<1	<1	<1	<1	<1	<1
Bromoform	<1	<1	<1	<1	<1	<1
Bromomethane	<2	<2	<2	<2	<2	<2
Carbon disulfide	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	<1	<1	<1	<1	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1	<1
Chloroethane	<2	<2	<2	<2	<2	<2
Chloroform	12	9.5	16	5.6	9.9	11
Chloromethane	<2	<2	<2	<2	<2	<2
cis–1,3–Dichloropropene	<1	<1	<1	<1	<1	<1
Dibromochloromethane	<1	<1	<1	<1	<1	<1
Dibromomethane	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2
Ethylbenzene	<1	<1	<1	<1	<1	<1
Freon 113	12	1.5	1.7	1.9	<1	<1
Methylene chloride	<1	<1	<1	<1	<1	<1
Styrene	<1	<1	<1	<1	<1	<1

Table 6-4. Monthly monitoring results for physical and chemical characteristics of the LLNL sanitary sewer effluent, 1997 (continued).

Parameter	Sample month					
	January	February	March	April	May	June
Grab sample (continued)						
Volatile organic compounds (μg/L) – 624 (continued)						
Tetrachloroethene	<1	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1	<1
Total xylene isomers	<2	<2	<2	<2	<2	<2
trans-1,3-Dichloropropene	<1	<1	<1	<1	<1	<1
Trichloroethene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	3.7	<1	<1	<1	<1	<1
Vinyl acetate	<10	<10	<10	<10	<10	<10
Vinyl chloride	<2	<2	<2	<2	<2	<2
Semivolatile organic compounds (μg/L) – 625						
1,2,4-Trichlorobenzene	<20	<10	<15	<5	<50	<50
1,2-Dichlorobenzene	<20	<10	<15	<5	<50	<50
1,3-Dichlorobenzene	<20	<10	<15	<5	<50	<50
1,4-Dichlorobenzene	<20	<10	<15	<5	<50	<50
2,4,5-Trichlorophenol	<20	<10	<15	<5	<50	<50
2,4,6-Trichlorophenol	<20	<10	<15	<5	<50	<50
2,4-Dichlorophenol	<20	<10	<15	<5	<50	<50
2,4-Dimethylphenol	<20	<10	<15	<5	<50	<50
2,4-Dinitrophenol	<100	<50	<75	<25	<250	<250
2,4-Dinitrotoluene	<20	<10	<15	<5	<50	<50
2,6-Dinitrotoluene	<20	<10	<15	<5	<50	<50
2-Chloronaphthalene	<20	<10	<15	<5	<50	<50
2-Chlorophenol	<20	<10	<15	<5	<50	<50
2-Methyl-4,6-dinitrophenol	<100	<50	<75	<25	<250	<250
2-Methylnaphthalene	<20	<10	<15	<5	<50	<50
2-Nitroaniline	<100	<50	<75	<25	<250	<250
2-Nitrophenol	<20	<10	<15	<5	<50	<50
3,3'-Dichlorobenzidine	<40	<20	<30	<10	<100	<100
3-Nitroaniline	<100	<50	<75	<25	<250	<250
4-Bromophenylphenylether	<20	<10	<15	<5	<50	<50
4-Chloro-3-methylphenol	<40	<20	<30	<10	<100	<100
4-Chloroaniline	<40	<20	<30	<10	<100	<100
4-Chlorophenylphenylether	<20	<10	<15	<5	<50	<50
4-Nitroaniline	<100	<50	<75	<25	<250	<250

Table 6-4. Monthly monitoring results for physical and chemical characteristics of the LLNL sanitary sewer effluent, 1997 (continued).

Parameter	Sample month					
	July	August	September	October	November	December
Grab sample (continued)						
Volatile organic compounds (μg/L) – 624 (continued)						
Tetrachloroethene	<1	<1	<1	<1	40	<1
Toluene	<1	<1	<1	<1	<1	<1
Total xylene isomers	<2	<2	<2	<2	<2	<2
trans–1,3–Dichloropropene	<1	<1	<1	<1	<1	<1
Trichloroethene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	<1	<1	<1	<1	<1	<1
Vinyl acetate	<10	<10	<10	<10	<10	<10
Vinyl chloride	<2	<2	<2	<2	<2	<2
Semivolatile organic compounds (μg/L) – 625						
1,2,4-Trichlorobenzene	<5	<5	<5	<10	<10	<10
1,2-Dichlorobenzene	<5	<5	<5	<10	<10	<10
1,3-Dichlorobenzene	<5	<5	<5	<10	<10	<10
1,4-Dichlorobenzene	<5	<5	<5	<10	<10	<10
2,4,5-Trichlorophenol	<5	<5	<5	<10	<10	<10
2,4,6-Trichlorophenol	<5	<5	<5	<10	<10	<10
2,4-Dichlorophenol	<5	<5	<5	<10	<10	<10
2,4-Dimethylphenol	<5	<5	<5	<10	<10	<10
2,4-Dinitrophenol	<25	<25	<25	<50	<50	<50
2,4-Dinitrotoluene	<5	<5	<5	<10	<10	<10
2,6-Dinitrotoluene	<5	<5	<5	<10	<10	<10
2-Chloronaphthalene	<5	<5	<5	<10	<10	<10
2-Chlorophenol	<5	<5	<5	<10	<10	<10
2-Methyl-4,6-dinitrophenol	<25	<25	<25	<50	<50	<50
2-Methylnaphthalene	<5	<5	<5	<10	<10	<10
2-Nitroaniline	<25	<25	<25	<50	<50	<50
2-Nitrophenol	<5	<5	<5	<10	<10	<10
3,3'-Dichlorobenzidine	<10	<10	<10	<20	<20	<20
3-Nitroaniline	<25	<25	<25	<50	<50	<50
4-Bromophenylphenylether	<10	<5	<5	<10	<10	<10
4-Chloro-3-methylphenol	<10	<10	<10	<20	<20	<20
4-Chloroaniline	<10	<10	<10	<20	<20	<20
4-Chlorophenylphenylether	<5	<5	<5	<10	<10	<10
4-Nitroaniline	<25	<25	<25	<50	<50	<50

Table 6-4. Monthly monitoring results for physical and chemical characteristics of the LLNL sanitary sewer effluent, 1997 (continued).

Parameter	Sample month					
	January	February	March	April	May	June
Grab sample (continued)						
Semivolatile organic compounds (µg/L) – 625 (continued)						
4-Nitrophenol	<100	<50	<75	<25	<250	<250
Acenaphthene	<20	<10	<15	<5	<50	<50
Acenaphthylene	<20	<10	<15	<5	<50	<50
Anthracene	<20	<10	<15	<5	<50	<50
Benzo(a)anthracene	<20	<10	<15	<5	<50	<50
Benzo(a)pyrene	<20	<10	<15	<5	<50	<50
Benzo(b)fluoranthene	<20	<10	<15	<5	<50	<50
Benzo(g,h,i)perylene	<20	<10	<15	<5	<50	<50
Benzo(k)fluoranthene	<20	<10	<15	<5	<50	<50
Benzoic acid	<100	<130	<75	<25	<250	<250
Benzyl alcohol	130	<20	58	<10	110	<100
Bis(2-chloroethoxy)methane	<20	<10	<15	<5	<50	<50
Bis(2-chloroethyl)ether	<20	<10	<15	<5	<50	<50
Bis(2-chloroisopropyl)ether	<20	<10	<15	<5	<50	<50
Bis(2-ethylhexyl)phthalate	<20	<10	54	<5	<50	<50
Butylbenzylphthalate	<20	<10	<15	<5	<50	<50
Chrysene	<20	<10	<15	<5	<50	<50
Di-*n*-butylphthalate	<20	<10	<15	<5	<50	<50
Di-*n*-octylphthalate	<20	<10	<15	<5	<50	<50
Dibenzo(a,h)anthracene	<20	<10	<15	<5	<50	<50
Dibenzofuran	<20	<10	<15	<5	<50	<50
Diethylphthalate	<20	<10	<15	5.1	<50	<50
Dimethylphthalate	<20	<10	<15	5	<50	<50
Fluoranthene	<20	<10	<15	<5	<50	<50
Fluorene	<20	<10	<15	<5	<50	<50
Hexachlorobenzene	<20	<10	<15	<5	<50	<50
Hexachlorobutadiene	<20	<10	<15	<5	<50	<50
Hexachlorocyclopentadiene	<20	<10	<15	<5	<50	<50
Hexachloroethane	<20	<10	<15	<5	<50	<50
Indeno(1,2,3-c,d)pyrene	<20	<10	<15	<5	<50	<50
Isophorone	<20	<10	<15	<5	<50	<50
m- and *p*-Cresol	79	38	25	110	<50	<50
N-Nitrosodi-*n*-propylamine	<20	<10	<15	<5	<50	<50
N-Nitrosodiphenylamine	<20	<10	<15	<5	<50	<50

Table 6-4. Monthly monitoring results for physical and chemical characteristics of the LLNL sanitary sewer effluent, 1997 (continued).

Parameter	Sample month					
	July	August	September	October	November	December
Grab sample (continued)						
Semivolatile organic compounds (µg/L) – 625 (continued)						
4-Nitrophenol	<25	<25	<25	<50	<50	<50
Acenaphthene	<5	<5	<5	<10	<10	<10
Acenaphthylene	<5	<5	<5	<10	<10	<10
Anthracene	<5	<5	<5	<10	<10	<10
Benzo(a)anthracene	<5	<5	<5	<10	<10	<10
Benzo(a)pyrene	<5	<5	<5	<10	<10	<10
Benzo(b)fluoranthene	<5	<5	<5	<10	<10	<10
Benzo(g,h,i)perylene	<5	<5	<5	<10	<10	<10
Benzo(k)fluoranthene	<5	<5	<5	<10	<10	<10
Benzoic acid	<25	<25	<25	<50	<50	180
Benzyl alcohol	170	<10	<10	<20	94	49
Bis(2-chloroethoxy)methane	<5	<5	<5	<10	<10	<10
Bis(2-chloroethyl)ether	<5	<5	<5	<10	<10	<10
Bis(2-chloroisopropyl)ether	<5	<5	<5	<10	<10	<10
Bis(2-ethylhexyl)phthalate	5.9	<5	8.6	<10	17	<10
Butylbenzylphthalate	<5	<5	<5	<10	<10	<10
Chrysene	<5	<5	<5	<10	<10	<10
Di-*n*-butylphthalate	<5	<5	<5	<10	<10	<10
Di-*n*-octylphthalate	<5	<5	<5	<10	<10	<10
Dibenzo(a,h)anthracene	<5	<5	<5	<10	<10	<10
Dibenzofuran	<5	<5	<5	<10	<10	<10
Diethylphthalate	<5	<5	<5	<10	<10	<10
Dimethylphthalate	<5	<5	<5	<10	<10	<10
Fluoranthene	<5	<5	<5	<10	<10	<10
Fluorene	<5	<5	<5	<10	<10	<10
Hexachlorobenzene	<5	<5	<5	<10	<10	<10
Hexachlorobutadiene	<5	<5	<5	<10	<10	<10
Hexachlorocyclopentadiene	<5	<5	<5	<10	<10	<10
Hexachloroethane	<5	<5	<5	<10	<10	<10
Indeno(1,2,3-c,d)pyrene	<5	<5	<5	<10	<10	<10
Isophorone	<5	<5	<5	<10	<10	<10
m- and *p*-Cresol	<5	<5	<5	<10	<10	33
N-Nitrosodi-*n*-propylamine	<5	<5	<5	<10	<10	<10
N-Nitrosodiphenylamine	<5	<5	<5	<10	<10	<10

Table 6-4. Monthly monitoring results for physical and chemical characteristics of the LLNL sanitary sewer effluent, 1997 (continued).

Parameter	Sample month					
	January	February	March	April	May	June
Grab sample (continued)						
Semivolatile organic compounds (μg/L) – 625 (continued)						
Naphthalene	<20	<10	<15	<5	<50	<50
Nitrobenzene	<20	<10	<15	<5	<50	<50
o-Cresol	110	34	<15	19	<50	<50
Pentachlorophenol	<100	<50	<75	<25	<250	<250
Phenanthrene	<20	<10	<15	<5	<50	<50
Phenol	<20	28	<15	31	<50	<50
Pyrene	<20	<10	<15	<5	<50	<50
Total recoverable phenolics (mg/L) – 420.1	0.1	0.04	0.018	0.029	0.027	0.079
Total cyanide (mg/L) – 335.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total oil and grease (mg/L) – 413.1						
6 A.M.	2.8	2.2	2.8	2.3	3.5	3.2
10 A.M.	30	31	49	31	55	40
2 P.M.	32	29	35	43	31	33
6 P.M.	17	20	21	16	24	17

Table 6-4. Monthly monitoring results for physical and chemical characteristics of the LLNL sanitary sewer effluent, 1997 (concluded).

Parameter	Sample month					
	July	August	September	October	November	December
Grab sample (continued)						
Semivolatile organic compounds (μg/L) – 625 (continued)						
Naphthalene	<5	<5	<5	<10	<10	<10
Nitrobenzene	<5	<5	<5	<10	<10	<10
o-Cresol	<5	<5	<5	<10	<10	<10
Pentachlorophenol	<25	<25	<25	<50	<50	<50
Phenanthrene	<5	<5	<5	<10	<10	<10
Phenol	<5	<5	<5	<10	<10	11
Pyrene	<5	<5	<5	<10	<10	<10
Total recoverable phenolics (mg/L) – 420.1	0.032	0.019	0.022	0.031	<0.01	0.046
Total cyanide (mg/L) – 335.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total oil and grease (mg/L) – 413.1						
6 A.M.	6.5	2.2	2.3	3.8	<1	2.6
10 A.M.	48	32	19	28	26	34
2 P.M.	33	24	19	15	23	35
6 P.M.	14	12	11	13	24	20

[a] The analysis was not requested.

[b] This result was not provided by the contract analytical laboratory. It was calculated from the provided nitrate or nitrite result, as appropriate.

[c] The 24-hour composite sample results for the metals of Table 6-2 are not re-reported in this section.

[d] Tributyltin was added as a permit parameter in September 1997 under the 1997–1998 wastewater discharge permit.

Note: Unless otherwise indicated, all of the analytical results are in mg/L and the numbers listed after the parameters show the EPA methods used for the analyses.

Table 6-5a. Daily flow totals for sanitary sewer effluent in megaliters (ML), 1997. Shaded areas indicate estimated flow totals for dates for which actual flow totals were not available. Weekend and holiday daily flow totals are shown in the boxed areas. Note that the majority of the flow volume recorded for a given day was actually discharged on the previous day.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.404	0.851	1.048	0.319	0.875	0.406	1.055	0.911	0.727	1.142	1.251	0.306
2	0.557	0.851	0.320	0.979	0.987	0.255	0.976	1.077	0.696	1.012	0.471	0.966
3	1.281	0.512	0.129	0.885	0.841	1.188	1.182	0.463	1.413	1.426	0.414	0.830
4	0.955	1.141	1.237	1.000	0.480	1.364	0.810	0.504	1.134	1.056	0.936	1.064
5	0.416	1.193	0.788	0.837	0.284	1.253	0.396	0.963	1.513	0.422	1.099	0.891
6	0.433	1.480	0.967	0.268	1.082	1.155	0.343	1.371	1.041	0.255	1.115	0.916
7	1.002	1.065	1.148	0.254	1.068	1.092	0.341	1.043	0.350	1.208	0.935	0.376
8	1.126	0.886	0.974	1.040	1.148	0.348	1.182	0.917	0.319	1.031	1.066	0.361
9	1.076	0.263	0.301	0.847	1.191	0.338	1.212	1.035	0.938	1.431	0.465	1.010
10	1.338	0.270	0.215	1.067	1.119	1.902	1.480	0.428	1.007	1.290	0.573	0.894
11	1.520	1.029	1.111	1.040	0.444	1.249	1.455	0.363	0.981	1.226	1.290	0.994
12	0.830	1.136	0.821	1.002	0.456	1.092	1.101	0.927	1.176	0.375	1.339	1.222
13	0.799	0.914	1.240	0.301	1.279	1.299	0.482	1.078	1.018	0.362	0.946	1.129
14	1.323	1.601	1.029	0.225	1.304	1.129	0.351	1.700	0.574	1.138	1.375	2.350
15	1.115	0.999	0.999	0.959	1.021	0.375	1.171	2.253	0.550	1.050	1.537	2.467
16	1.186	0.278	0.370	1.034	1.150	0.321	1.133	1.194	1.365	1.010	0.642	1.527
17	1.417	0.503	0.357	1.060	1.137	1.029	1.227	0.647	1.247	1.112	0.404	0.992
18	0.938	0.468	1.121	0.895	0.562	1.449	1.358	0.576	1.257	0.798	1.653	0.908
19	0.578	0.812	1.063	1.058	0.301	1.135	1.133	1.398	1.061	0.424	1.001	0.992
20	0.553	1.035	1.091	0.424	1.265	1.083	0.486	1.173	1.011	0.378	1.253	0.993
21	0.709	0.959	0.989	0.312	1.177	0.879	0.400	1.299	0.876	0.987	1.038	0.457
22	1.007	1.024	0.910	1.027	1.126	0.489	1.268	1.421	1.922	0.997	0.895	0.223
23	2.041	0.249	0.247	1.069	1.071	0.289	1.199	1.323	1.162	0.939	0.322	0.887
24	0.471	0.276	0.216	0.952	1.471	1.173	1.019	0.888	1.290	0.979	0.287	0.799
25	1.742	0.971	1.034	0.790	0.527	1.318	1.021	0.604	1.049	0.866	1.112	0.692
26	0.967	1.209	1.134	0.973	0.616	1.372	1.005	1.083	1.184	0.317	1.286	0.341
27	0.749	0.987	1.253	0.330	0.579	1.056	0.484	1.465	1.330	0.341	0.822	0.258
28	1.090	0.980	0.886	0.275	1.226	0.975	0.408	1.078	0.740	0.977	0.272	0.242
29	1.179		0.974	0.992	1.120	0.393	1.175	1.351	0.779	1.019	0.234	0.331
30	0.861		0.345	1.077	1.013	0.330	1.237	1.251	1.172	0.847	0.325	0.740
31	1.271		0.228		1.049		0.956	0.677		1.102		1.047

Table 6-5b. Monthly and annual flow summary statistics for sanitary sewer effluent in megaliters (ML), 1997.

Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1997
Weekend days and holidays													
Total	7.0	3.7	2.7	2.7	4.2	3.5	3.7	5.2	7.5	2.9	4.4	7.7	55.3
Minimum	0.404	0.249	0.129	0.225	0.284	0.255	0.341	0.363	0.319	0.255	0.234	0.223	0.129
Maximum	0.967	0.851	0.370	0.424	0.616	0.489	0.486	0.888	1.922	0.424	0.642	2.467	2.467
Mean	0.636	0.408	0.273	0.301	0.472	0.354	0.410	0.572	0.753	0.359	0.401	0.701	0.476
Weekdays													
Total	23.9	20.3	21.8	20.6	24.7	24.2	25.4	27.3	23.3	24.6	21.9	19.5	277.6
Minimum	0.471	0.812	0.788	0.790	0.841	0.879	0.810	0.911	0.938	0.798	0.822	0.692	0.471
Maximum	2.041	1.601	1.253	1.077	1.471	1.902	1.48	2.253	1.513	1.431	1.653	1.527	2.253
Mean	1.197	1.067	1.039	0.980	1.124	1.210	1.153	1.241	1.167	1.071	1.155	0.975	1.115
All days													
Total	30.9	23.9	24.5	23.3	29.0	27.7	29.0	32.5	30.9	27.5	26.4	27.2	332.9
Minimum	0.404	0.249	0.129	0.225	0.284	0.255	0.341	0.363	0.319	0.255	0.234	0.223	0.129
Maximum	2.041	1.601	1.253	1.077	1.471	1.902	1.480	2.253	1.922	1.431	1.653	2.467	2.467
Mean	0.998	0.855	0.792	0.776	0.934	0.925	0.937	1.05	1.03	0.888	0.879	0.878	0.912

Table 6-6. Ground water monitoring data for total toxic organic compounds under Permit 1510G, 1997.

Analyte (µg/L)	Discharge date										
	2/19	3/19	5/15–6/16	6/16–10/17	6/18	7/8–11	7/15–18	8/15–9/4	8/19–9/5	9/16–19	10/2	10/18
1,1,1-Trichloroethane	<0.4	<0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	<0.4	<0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	4.5	4.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.7	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethene (total)										<1		
1,2-Dichloropropane			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinylether			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	<0.4	<0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorobenzene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	7.9	7.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloromethane			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethene	8.2	8.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide	<0.4	<0.4								<0.5		
Freon 113	5.7	5.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5
Methylene chloride			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	1.7	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5
trans-1,2-Dichloroethene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	56	56	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.3	<0.5	<0.5
Trichlorofluoromethane			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vinyl chloride			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Table 6-7. Weekly composite results for tritium (in mBq/mL) for the LWRP effluent, 1997.

Composite dates	Activity[a]	LOS[b]	Composite dates	Activity[a]	LOS[b]
12/30/1996–1/5/1997	–6.85	10.8	7/7–13	–1.95	11.4
1/6–12	–4.40	11.2	7/14–20	–5.29	11.3
1/13–19	4.44	10.9	7/21–27	–3.40	11.8
1/20–26	–7.03	11.4	7/28–8/3	1.45	11.1
1/27–2/2	–2.08	10.7	8/4–10	2.46	11.0
2/3–9	4.07	10.7	8/11–17	4.77	11.0
2/10–16	–11.1	11.6	8/18–24	–6.14	12.5
2/17–23	–1.70	11.6	8/25–31	–16.8	13.8
2/24–3/2	–4.77	11.6	9/1–7	22.5 ± 8.8	15.2
3/3–9	18.8	10.8	9/8–14	1.93	13.7
3/10–16	10.6	10.8	9/15–21	–8.44	12.1
3/17–23	–6.77	11.3	9/22–28	–12.8	12.3
3/24–30	–2.69	11.2	9/29–10/5	1.51	12.0
3/31–4/6	–4.14	11.2	10/6–12	5.44	11.2
4/7–13	1.20	11.1	10/13 –19	–2.76	11.3
4/14–20	5.55	10.9	10/20–26	–1.31	9.03
4/21 –27	5.03	10.9	10/27–11/2	5.03	11.5
4/28–5/4	3.32	10.9	11/3–9	–5.74	11.8
5/5–11	4.07	11.0	11/10–16	4.07	11.3
5/12–18	0.681	11.1	11/17–23	–7.33	11.5
5/19–25	2.39	10.8	11/24–30	–2.28	11.2
5/26–6/1	2.90	10.9	12/1–7	–1.44	11.2
6/2–8	1.62	11.0	12/8–14	3.61	10.7
6/9–15	0.596	11.0	12/15–21	–1.36	11.3
6/16–22	2.21	11.0	12/22–28	1.02	10.7
6/23–29	8.40	10.5	12/29/1997–1/4/1998	–4.14	11.3
6/30–7/6	1.02	11.2			

a The activities shown in this table are reported concentrations and their associated 2σ counting errors. Activities shown do not include the 2σ counting errors when the reported concentrations are below the limit of sensitivity.

b LOS = Limit of sensitivity.

7

Surface Water

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Introduction

Lawrence Livermore National Laboratory monitors surface water at the Livermore site, in surrounding regions of the Livermore Valley, and at Site 300 and vicinity in the nearby Altamont Hills. At the first two locales, LLNL monitors reservoirs and ponds, the LLNL swimming pool, rainfall, tap water, and storm water runoff. Water samples are analyzed for radionuclides and a wide range of nonradioactive constituents. At Site 300 and vicinity, surface water monitoring encompasses rainfall and storm water runoff. Samples of this water are analyzed for radionuclides, high explosives (HE), total organic carbon, total organic halides, total suspended solids, conductivity, and pH. Chapter 7 of the main volume includes summary data tables and a detailed discussion and analysis of the data. This supplemental chapter presents the complete dataset for 1997, including a summary of analyses requested in storm water samples and a summary of constituents for which analyses were conducted but which were never detected. This chapter also provides detailed data on monitoring of the Drainage Retention Basin (DRB) at the Livermore site and the cooling towers at Site 300. This data supplements material provided in the Surface Water Chapter (Chapter 7) of the main volume.

Storm Water

LLNL technicians collect storm water samples for nonradiological analysis directly into sample bottles for storm water runoff grab samples. Samples analyzed for tritium are collected in 250-mL, argon-flushed glass containers; samples for gross alpha and gross beta measurements are collected in 1000-mL polyethylene bottles. Results for Livermore site tritium, gross alpha and gross beta are presented in **Table 7-1**. As part of a source identification study, selected constituents were evaluated for both total and dissolved concentrations. Results for these constituents are presented in **Table 7-2**. Results for all other nonradiological constituents at the Livermore site are presented in **Table 7-3**. **Table 7-4** summarizes results for constituents for which analyses were conducted, but which were never detected.

7 Surface Water

Rainfall

Rainfall is collected in stainless steel buckets mounted about 1 m above the ground. Samples are decanted into 500-mL argon-flushed flint-glass bottles fitted with glass stoppers and analyzed for tritium. Results are presented in **Table 7-5**.

Drainage Retention Basin

Drainage Retention Basin (DRB) discharge sampling locations which monitor compliance with the Livermore site's Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Record of Decision are shown in Figure 7-2, main volume. Figure 7-9 of the main volume shows the sampling locations used to monitor how water quality compares with maintenance goals and action levels. Weekly sampling for dissolved oxygen and temperature occurs at all eight locations identified in Figure 7-9 of the main volume. Weekly turbidity measurements and monthly, quarterly, semiannual, and annual samples are collected at sample location CDBE.

Table 7-6 shows the compliance monitoring data for samples collected at sample location CDBX from four releases occurring from the DRB. This table also shows data for samples collected concurrently at WPDC (one of the Livermore site storm water discharge sample locations). Monthly, quarterly, and semiannual maintenance monitoring data for 1997, that were collected at sample location CDBE are shown in **Tables 7-7a**, **b**, and **c**. **Table 7-8** provides the weekly field measurements collected from sample locations CDBA, CDBC, CDBD, CDBE, CDBF, CDBJ, CDBK, and CDBL. Field data from the DRB are summarized in **Table 7-9**. **Table 7-11** contains annual mass loadings for CDBX.

Other Waters

LLNL technicians sample surface and drinking water near the Livermore site and in the Livermore Valley using a tethered pail to collect water from surface sources; other locations are sampled directly from the outfall. Samples for tritium analysis are collected in 500-mL, argon-flushed glass containers; those for other radiological analyses are collected in acidified 1000-mL polyethylene bottles. Results are presented in **Table 7-10**.

Table 7-1. Radioactivity in storm water runoff (Bq/L) at Livermore site, 1997.

Location	Date	Tritium	Gross alpha	Gross beta
ALPE	1/15	2.06 ± 1.15	0.00910 ± 0.0481	0.203 ± 0.144
	11/15	1.24 ± 1.24	0.00410 ± 0.0315	0.179 ± 0.137
	12/8	1.54 ± 1.54	0.0185 ± 0.0481	0.381 ± 0.152
ALPO	1/15	1.61 ± 1.13	0.145 ± 0.0888	0.273 ± 0.141
	11/15	1.24 ± 1.24	0.0673 ± 0.0666	0.220 ± 0.148
	12/8	1.56 ± 1.56	0.109 ± 0.0629	0.142 ± 0.144
ASS2	1/15	1.50 ± 1.13	0.107 ± 0.0703	0.334 ± 0.152
	11/15	1.27 ± 1.27	0.00770 ± 0.0270	0.166 ± 0.137
	12/8	1.47 ± 1.47	0.0159 ± 0.0311	0.129 ± 0.200
ASW	1/15	1.75 ± 1.14	0.0592 ± 0.0555	0.611 ± 0.155
	5/23	1.40 ± 1.40	0.0366 ± 0.0370	0.249 ± 0.137
	11/15	1.28 ± 1.28	0.0644 ± 0.0407	0.241 ± 0.130
	12/8	1.51 ± 1.51	0.0518 ± 0.0407	0.154 ± 0.204
CDB	1/15	3.59 ± 1.21	0.0592 ± 0.0281	0.030 ± 0.126
	11/15	3.32 ± 1.23	0.0206 ± 0.0344	0.0810 ± 0.133
	12/8	9.29 ± 1.84	0.0079 ± 0.0326	0.089 ± 0.200
CDB2	1/15	1.41 ± 1.13	0.0944 ± 0.0629	0.308 ± 0.141
	11/15	17.7 ± 8.93	0.0269 ± 0.0311	0.039 ± 0.130
	12/8	11.3 ± 1.94	0.0470 ± 0.0777	0.256 ± 0.218
CDBX	1/15	20.3 ± 1.71	0.0444 ± 0.0407	0.100 ± 0.137
	12/8	21.1 ± 2.20	0.0977 ± 0.0555	0.122 ± 0.211
GRNE	1/15	3.70 ± 1.20	0.0429 ± 0.0444	0.262 ± 0.118
	11/15	1.25 ± 1.25	0.154 ± 0.0518	0.273 ± 0.144
	12/08	3.35 ± 1.64	0.0525 ± 0.0444	<0.274 ± 0.196
WPDC	1/15	13.4 ± 1.52	0.0243 ± 0.0407	0.0190 ± 0.133
	5/23	359 ± 6.45	0.0792 ± 0.0444	0.245 ± 0.141
	11/15	6.25 ± 2.54	0.0389 ± 0.0366	0.0940 ± 0.133
	12/8	15.80 ± 2.05	0.0796 ± 0.0518	0.100 ± 0.137

Table 7-2. Metals detected in storm water runoff at the Livermore site in 1997.

Parameter	Storm date	ALPE		ALPO		ASS2		ASW	
		Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
Metals (mg/L)									
Aluminum	1/15	0.56	—[a]	<0.05	—[a]	<0.05	—[a]	0.28	—[a]
		0.73	—[a]	0.44	—[a]	0.56	—[a]	0.78	—[a]
	11/15	<0.05	14	<0.05	5.9	<0.05	5.3	<0.05	60
		<0.05	9.9	<0.05	0.76	<0.05	1.4	<0.05	6.5
	12/8	<0.05	3	<0.05	7.3	<0.05	2.3	<0.05	8.1
		0.29	2.8	<0.05	7	<0.05	1.2	<0.05	4.8
Antimony	1/15	<0.01	—[a]	<0.01	—[a]	<0.01	—[a]	<0.01	—[a]
	11/15	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
	12/8	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Arsenic	1/15	<0.002	—[a]	0.005	—[a]	0.003	—[a]	0.003	—[a]
	11/15	<0.002	0.0024	0.0036	0.0039	<0.002	<0.002	<0.002	0.0055
	12/8	0.0033	0.0039	0.005	0.0052	<0.002	<0.002	<0.002	<0.002
Barium	1/15	0.084	—[a]	0.13	—[a]	0.3	—[a]	0.12	—[a]
	11/15	0.033	0.16	0.11	0.13	<0.025	0.053	0.079	0.48
	12/8	0.083	0.087	0.067	0.12	<0.025	0.034	0.13	0.1
Beryllium	1/15	<0.0002	—[a]	<0.0002	—[a]	<0.0002	—[a]	<0.0002	—[a]
	11/15	0.00044	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0016	<0.0002
	12/8	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Boron	1/15	3.1	—[a]	4.3	—[a]	1.2	—[a]	1.2	—[a]
	11/15	0.059	0.15	2.5	2.5	0.055	0.063	<0.05	0.065
	12/8	19	17	1.7	1.5	<0.05	<0.05	0.076	0.052
Cadmium	1/15	<0.0005	—[a]	<0.0005	—[a]	<0.0005	—[a]	<0.0005	—[a]
	11/15	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0021
	12/8	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	1/15	0.005	—[a]	0.002	—[a]	0.003	—[a]	0.006	—[a]
	11/15	<0.001	0.024	<0.001	0.007	<0.001	0.017	<0.001	0.11
	12/8	0.0013	0.0061	<0.001	0.011	<0.001	0.0047	<0.001	0.018
Cobalt	1/15	<0.05	—[a]	<0.05	—[a]	<0.05	—[a]	<0.05	—[a]
	11/15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	12/8	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Copper	1/15	<0.01	—[a]	<0.01	—[a]	<0.01	—[a]	<0.01	—[a]
		0.004	—[a]	0.004	—[a]	0.009	—[a]	0.005	—[a]
	11/15	<0.01	0.019	<0.01	0.019	<0.01	0.018	<0.01	0.12
		<0.001	0.029	<0.001	0.02	<0.001	0.024	<0.001	0.12
	12/8	<0.01	0.014	<0.01	0.015	<0.01	<0.01	<0.01	0.023
		0.0044	0.0085	0.007	0.015	0.0048	0.013	0.0038	0.015

CDB		CDB2		CDBX		GRNE		WPDC	
Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
0.11	—[a]	0.46	—[a]	0.53	4	0.37	—[a]	0.37	3.8
0.34	—[a]	0.47	—[a]	0.45	3.7	0.23	—[a]	0.45	3.8
<0.05	6.3	<0.05	14	—[b]	—[b]	<0.05	70	<0.05	15
<0.05	1.7	<0.05	2.4	—[b]	—[b]	<0.05	7.4	<0.05	2.6
<0.05	3	<0.05	5.6	<0.05	1.1	<0.05	5.2	<0.05	7.3
<0.05	2.1	<0.05	5.1	<0.05	1.5	<0.05	6.1	<0.05	5.2
<0.01	—[a]	<0.01	—[a]	<0.01	<0.004	<0.01	—[a]	<0.01	<0.005
<0.004	<0.004	<0.004	<0.004	—[b]	—[b]	<0.004	<0.004	<0.004	<0.004
<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
<0.002	—[a]	<0.002	—[a]	0.002	0.003	<0.002	—[a]	0.003	0.0029
<0.002	0.0024	0.0038	0.0051	—[b]	—[b]	<0.002	0.0057	0.0021	0.0034
<0.002	<0.002	<0.002	<0.002	0.0024	0.0025	<0.002	<0.002	<0.002	0.0024
0.028	—[a]	0.085	—[a]	0.079	0.088	0.093	—[a]	0.1	0.1
0.061	0.06	0.087	0.12	—[b]	—[b]	0.096	0.63	0.077	0.11
0.037	0.058	0.093	0.12	0.11	0.11	0.078	0.17	0.1	0.14
<0.0002	—[a]	<0.0002	—[a]	<0.0002	<0.0002	<0.0002	—[a]	<0.0002	<0.0002
0.00021	<0.0002	0.00042	<0.0002	—[b]	—[b]	0.0023	<0.0002	<0.0002	<0.0002
<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00024	<0.0002	<0.0002
0.055	—[a]	2.7	—[a]	0.93	0.89	0.26	—[a]	1.4	1.3
<0.05	<0.05	0.071	0.074	—[b]	—[b]	0.14	0.17	0.11	0.13
0.078	0.077	9	7.5	1.6	1.4	0.28	0.26	0.91	0.8
<0.0005	—[a]	<0.0005	—[a]	0.001	<0.0005	<0.0005	—[a]	<0.0005	<0.0005
<0.0005	<0.0005	<0.0005	0.0011	—[b]	—[b]	<0.0005	0.00064	<0.0005	0.00061
<0.0005	0.00055	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005
0.003	—[a]	0.003	—[a]	0.003	0.0087	0.004	—[a]	0.002	0.0078
<0.001	0.016	0.0014	0.032	—[b]	—[b]	<0.001	0.1	0.0011	0.021
0.0017	0.0091	<0.001	0.014	<0.001	0.0059	0.0014	0.017	0.0014	0.016
<0.05	—[a]	<0.05	—[a]	<0.05	<0.05	<0.05	—[a]	<0.05	<0.05
<0.05	<0.05	<0.05	<0.05	—[b]	—[b]	<0.05	<0.05	<0.05	<0.05
<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
<0.01	—[a]	<0.01	—[a]	<0.01	0.0073	<0.01	—[a]	<0.01	0.0071
0.003	—[a]	0.018	—[a]	0.004	<0.01	0.006	—[a]	0.005	<0.01
<0.01	0.014	<0.01	0.024	—[b]	—[b]	<0.01	0.059	<0.01	0.029
<0.001	0.022	<0.001	0.031	—[b]	—[b]	<0.001	0.059	<0.001	0.021
<0.01	<0.01	<0.01	0.014	<0.01	<0.01	<0.01	0.01	<0.01	0.013
0.0043	0.012	0.0053	0.014	0.0071	0.005	0.0027	0.0073	0.0062	0.017

Table 7-2. Metals detected in storm water runoff at the Livermore site in 1997 (continued).

Parameter	Storm date	ALPE		ALPO		ASS2		ASW	
		Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
Metals (mg/L)									
Chromium(VI)	1/15	0.002	—[(a)]	0.004	—[(a)]	0.002	—[(a)]	0.002	—[(a)]
	11/15	0.003	—[(b)]	0.003	—[(b)]	0.002	—[(b)]	0.004	—[(b)]
	12/8	<0.002		<0.002		<0.002		<0.002	
Iron	1/15	0.46	—[(a)]	0.052	—[(a)]	0.067	—[(a)]	0.22	—[(a)]
		0.57	—[(a)]	0.37	—[(a)]	0.42	—[(a)]	0.62	—[(a)]
	11/15	<0.05	11	<0.05	5.2	<0.05	5.9	0.07	63
		<0.05	9.6	<0.05	1	<0.05	1.6	0.074	5.6
	12/8	0.053	2.6	<0.05	6.7	<0.05	2.3	<0.05	10
		0.28	2.4	<0.05	6.3	<0.05	1.3	<0.05	6.6
Lead	1/15	<0.005	—[(a)]	<0.005	—[(a)]	<0.005	—[(a)]	<0.005	—[(a)]
	11/15	0.019	0.011	<0.005	<0.005	<0.005	0.0098	<0.005	0.064
	12/8	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.011
Magnesium	1/15	—[(a)]	10.9	—[(a)]	27	—[(a)]	36	—[(a)]	36
		—[(a)]	—[(a)]	—[(a)]	—[(a)]	—[(a)]	—[(a)]	—[(a)]	—[(a)]
	11/15	1.8	4.8	24	23	1.5	3	1.2	16
	12/8	66	58	13	14	1.9	2.3	2.4	5.2
Manganese	1/15	0.018	—[(a)]	0.012	—[(a)]	<0.01	—[(a)]	<0.01	—[(a)]
		0.02	—[(a)]	0.091	—[(a)]	0.054	—[(a)]	0.072	—[(a)]
	11/15	0.018	0.23	<0.01	0.1	0.014	0.14	<0.01	1.3
		<0.01	0.26	<0.01	0.079	<0.01	0.11	<0.01	1
	12/8	0.055	0.103	<0.01	0.093	<0.01	0.04	<0.01	0.23
		0.057	0.1	<0.01	0.087	<0.01	0.022	0.019	0.2
Mercury	1/15	<0.0002		<0.0002		<0.0002		<0.0002	
	11/15	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0039
	12/8	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	1/15	<0.025	—[(a)]	<0.025	—[(a)]	<0.025	—[(a)]	<0.025	—[(a)]
	11/15	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
	12/8	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	1/15	<0.05	—[(a)]	<0.05	—[(a)]	<0.05	—[(a)]	<0.05	—[(a)]
		0.016	—[(a)]	<0.002	—[(a)]	0.013	—[(a)]	0.03	—[(a)]
	11/15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.13
		0.0039	0.043	0.0027	0.008	0.0025	0.029	<0.002	0.012
	12/8	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
		0.0082	0.012	0.0028	0.011	<0.002	0.006	0.0039	0.03
Selenium	1/15	<0.02	—[(a)]	<0.02	—[(a)]	<0.02	—[(a)]	<0.02	—[(a)]
	11/15	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	12/8	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002

CDB		CDB2		CDBX		GRNE		WPDC	
Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
0.002	—[a]	<0.002	—[a]	0.002	—[a]	<0.002	—[a]	0.003	
<0.002	—[b]	0.002	—[b]	—[b]	—[b]	0.004	—[b]	0.003	
<0.002		<0.002		<0.002		<0.002		<0.002	
0.1	—[a]	0.39	—[a]	0.41	3.3	0.29	—[a]	0.29	3.2
0.28	—[a]	0.39	—[a]	0.36	3.2	0.22	—[a]	0.35	3.2
<0.05	5.8	0.056	13	—[b]	—[b]	<0.05	62	<0.05	15
<0.05	1.8	0.059	2.3	—[b]	—[b]	<0.05	5.4	<0.05	2.7
0.05	3	0.052	5.2	<0.05	1.3	<0.05	5.1	<0.05	7.9
0.059	2.5	<0.05	5		1.7		6.3		5.9
<0.005	—[a]	<0.005	—[a]	<0.005	<0.005	<0.005	—[a]	<0.005	<0.005
<0.005	0.012	<0.005	0.014	—[b]	—[b]	<0.005	0.026	<0.005	0.012
<0.005	0.006	0.0075	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
—[a]	2.3	—[a]	11.2	—[a]	5.3	—[a]	5.9	—[a]	9.9
—[a]	—[a]	—[a]	—[a]	—[a]	5.2	—[a]	—[a]	—[a]	9.9
1.5	2.6	1.8	4.4	—[b]	—[b]	3.3	17	1.9	5
3.8	4.2	31	30	15	14	6.6	7.6	10	11
<0.01	—[a]	0.016	—[a]	<0.01	0.05	<0.01	—[a]	<0.01	0.051
0.016	—[a]	0.021	—[a]	<0.01	0.051	<0.01	—[a]	0.011	0.052
0.013	0.13	0.02	0.25	—[b]	—[b]	<0.01	1.2	<0.01	0.3
0.012	0.11	<0.01	0.2	—[b]	—[b]	<0.01	0.84	<0.01	0.27
0.019	0.059	0.014	0.12	0.016	0.061	<0.01	0.085	0.01	0.13
0.016	0.056	0.02	0.11	<0.01	0.067	<0.01	0.11	<0.01	0.12
<0.0002		<0.0002	—[a]	<0.0002	<0.00025	<0.0002	—[a]	<0.0002	<0.00025
<0.0002	<0.0002	<0.0002	<0.0002	—[b]	—[b]	<0.0002	<0.0002	<0.0002	<0.0002
<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00036	<0.0002	<0.0002
<0.025	—[a]	<0.025	—[a]	<0.025	<0.025	<0.025	—[a]	<0.025	<0.025
<0.025	<0.025	<0.025	<0.025	—[b]	—[b]	<0.025	<0.025	<0.025	<0.025
<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
<0.05	—[a]	<0.05	—[a]	<0.05	0.014	<0.05	—[a]	<0.05	0.0095
<0.002	—[a]	<0.002	—[a]	<0.002	<0.05	0.031	—[a]	<0.002	<0.05
<0.05	<0.05	<0.05	<0.05	—[b]	—[b]	<0.05	0.11	<0.05	<0.05
0.002	0.018	0.004	0.041	—[b]	—[b]	<0.002	0.113	<0.002	0.027
<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
0.0022	0.019	0.0042	0.028	0.0035	0.008	0.0026	0.017	0.0036	0.024
<0.02	—[a]	<0.02	—[a]	<0.02	<0.002	<0.02	—[a]	<0.02	<0.002
<0.002	<0.002	<0.002	<0.002	—[b]	—[b]	<0.002	<0.002	<0.002	<0.002
<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002

Table 7-2. Metals detected in storm water runoff at the Livermore site in 1997 (concluded).

Parameter	Storm date	ALPE		ALPO		ASS2		ASW	
		Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
Metals (mg/L)									
Silver	1/15	<0.001	—[a]	<0.001	—[a]	<0.001	—[a]	<0.001	—[a]
	11/15	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	12/8	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sodium	1/15	—[a]	97	—[a]	170	—[a]	102	—[a]	92
		—[a]	—[a]	—[a]	—[a]	—[a]	—[a]	—[a]	—[a]
	11/15	6.6	5.5	167	146	3.3	2.4	3	2.5
	12/8	583	602	94	85	4.7	3.8	7.8	6.4
Thallium	1/15	<0.001	—[a]	<0.001	—[a]	<0.001	—[a]	<0.001	—[a]
	11/15	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	12/8	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	1/15	<0.01	—[a]	<0.01	—[a]	<0.01	—[a]	<0.01	—[a]
	11/15	<0.01	0.022	<0.01	0.13	<0.01	<0.01	<0.01	0.023
	12/8	<0.01	0.011	0.012	0.024	<0.01	<0.01	<0.01	0.013
Zinc	1/15	<0.01	—[a]	<0.01	—[a]	<0.01	—[a]	0.057	—[a]
		<0.01	—[a]	0.01	—[a]	<0.01	—[a]	0.011	—[a]
	11/15	0.012	0.067	<0.01	0.032	0.053	0.14	0.027	0.46
		<0.02	0.078	<0.02	0.03	0.055	0.13	0.065	0.47
	12/8	<0.01	0.016	<0.01	0.028	0.048	0.078	0.038	0.15
		<0.02	<0.02	<0.02	0.031	0.057	0.079	0.048	0.22

[a] Simultaneous analysis of dissolved and total metals had not begun on this date. However, it was done at location CDBX and WPDC because DRB monitoring requires analysis of total metals.

[b] Not sampled because of flow at location CDBX.

CDB		CDB2		CDBX		GRNE		WPDC	
Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
<0.001	—[(a)]	<0.001	—[(a)]	<0.001	<0.001	<0.001	—[(a)]	<0.001	<0.001
<0.001	<0.001	<0.001	<0.001	—[(b)]	—[(b)]	<0.001	<0.001	<0.001	<0.001
0.0018	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
—[(a)]	2.9	—[(a)]	95	—[(a)]	31	—[(a)]	16.3	—[(a)]	56
—[(a)]	—[(a)]	—[(a)]	—[(a)]	—[(a)]	31	—[(a)]	—[(a)]	—[(a)]	57
3.2	2.8	4.1	3.5	—[(b)]	—[(b)]	9.9	10	6.8	6
10	8.4	338	297	75	65	20	18	50	44
<0.001	—[(a)]	<0.001	—[(a)]	<0.001	<0.001	<0.001	—[(a)]	<0.001	<0.001
<0.001	<0.001	<0.001	<0.001	—[(b)]	—[(b)]	<0.001	<0.001	<0.001	<0.001
<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
<0.01	—[(a)]	<0.01	—[(a)]	<0.01	0.01	<0.01	—[(a)]	<0.01	0.012
<0.01	<0.01	<0.01	<0.01	—[(b)]	—[(b)]	<0.01	0.037	<0.01	<0.01
<0.01	<0.01	<0.01	0.014	<0.01	<0.01	<0.01	0.017	<0.01	0.015
<0.01	—[(a)]	<0.01	—[(a)]	0.017	0.049	0.026	—[(a)]	0.02	0.058
0.079	—[(a)]	0.014	—[(a)]	0.021	0.086	0.04	—[(a)]	0.033	0.082
0.079	0.18	0.05	0.17	—[(b)]	—[(b)]	<0.01	0.34	0.087	0.35
0.087	0.18	0.057	0.15	—[(b)]	—[(b)]	<0.02	0.25	0.054	0.24
0.1	0.17	0.015	0.05	0.04	0.038	0.032	0.083	0.064	0.17
0.11	0.17	0.029	0.059	<0.02	0.036	0.029	0.095	0.087	0.24

Table 7-3. Nonradioactive compounds detected in storm water runoff, Livermore site, 1997.

Parameter	Storm date	ALPE	ALPO	ASS2	ASW	CDB	CDB2	CDBX	GRNE	WPDC
Miscellaneous (mg/L)										
Bicarbonate alkalinity (as $CaCO_3$)	1/15	102	190	190	182	11.4	95.9	57.7	81.9	85.2
								56.3		84.4
	11/15	21	180	14	14	12	19		29	21
	12/8	330	120	20	15	27	150	120	61	89
Bicarbonate alkalinity (as $CaCO_3$)	1/15	99.5	190	190	182	10.7	95.9	59.2	77.7	86
	11/15	21	170	14	14	12	18		31	19
	12/8	330	120	20	15	28	160	120	63	88
Bromide	1/15	0.15	0.63	0.21	0.2	<0.05	0.16	0.05	<0.05	0.16
	11/15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05
	12/8	1.4	0.38	<0.05	<0.05	0.07	0.68	0.29	<0.05	0.16
Calcium	1/15	21	78	67	65	4.1	21	13	16	24
								13		24
	11/15	7.2	52	4.5	12	4.3	6.4		27	7
		5.8	57	4.4	3.9	4.2	5.6		13	5.6
	12/8	110	33	6.2	9.4	8.2	59	30	20	25
		130	34	6.6	8.1	8.9	63	34	21	25
Chemical oxygen demand	1/15	101	52	110	120	34	98	41	93	46
	11/15	45	36	51	82	40	68		69	54
	12/8	130	29	24	82	31	81	28	25	24
Chloride	1/15	95.3	212	100	97.7	3.2	98.1	28.1	5.7	61.5
		94.8	214	101	98.6	3.30	98.5	28.3	5.5	60.8
								28		61.2
	11/15	4.4	180	1.4	1.0	2.9	2.3		6.4	4.9
		3.8	174	1.3	0.98	2.8	2.2		7.4	5.1
	12/8	700	89	3.9	4.9	12	280	83	7.8	52
		700	88	3.8	2.8	12	310	83	7.9	52
Fluoride	1/15	0.28	0.88	0.37	0.36	0.06	0.25	0.13	0.12	0.27
		0.25	0.89	0.36	0.35	0.06	0.25	0.14	0.11	0.26
								0.12		0.25
	11/15	0.06	0.72	0.06	0.06	0.06	0.06		0.16	0.07
		0.06	0.72	0.06	0.06	0.06	0.06		0.16	0.07
	12/8	1.0	0.49	0.05	<0.05	0.07	0.47	0.23	0.15	0.20
		1.0	0.49	0.05	<0.05	0.07	0.52	0.24	0.16	0.20
Nitrate (as N)	1/15	0.2	2.6	3.5	3.5	0.6	0.2	0.6	3.0	1.2
		0.20	2.6	3.4	3.5	0.5	0.2	0.6	2.4	1.2
								0.6		1.2

Table 7-3. Nonradioactive compounds detected in storm water runoff, Livermore site, 1997 (continued).

Parameter	Storm date	ALPE	ALPO	ASS2	ASW	CDB	CDB2	CDBX	GRNE	WPDC
Miscellaneous (mg/L) (cont'd)										
Nitrate (as N) (cont'd)	11/15	1.2	0.83	1.1	0.42	0.79	0.77		4.9	0.53
		1	0.79	1.0	0.39	0.70	0.77		4.90	0.53
	12/8	0.53	2.0	0.58	0.44	0.77	0.62	0.74	8.6	1.3
		0.50	2.1	0.74	0.80	0.77	0.68	0.74	8.90	1.30
Nitrate (as NO_3)	1/15	0.9	11.5	15.5	15.5	2.7	0.9	2.7	13.3	5.3
		0.9	11.5	15.1	15.5	2.2	0.9	2.7	10.6	5.3
								2.7		5.3
	11/15	5.3	3.7	4.9	1.9	3.5	3.4		22	2.4
		4.4	3.5	4.4	1.7	3.1	3.4		22	2.4
	12/8	2.2	9.3	3.3	3.5	3.4	3.0	3.3	39	5.8
		2.3	8.9	2.6	1.9	3.4	2.7	3.3	38	5.8
Nitrite (as N)	1/15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
								<0.1		<0.1
	11/15	0.05	0.05	0.03	0.06	0.03	0.05		0.06	0.04
		0.05	0.06	0.04	0.06	0.03	0.05		0.09	0.04
	12/8	0.04	0.05	0.02	0.02	0.03	0.04	0.05	0.03	0.04
	12/8	0.04	0.07	0.04	0.02	0.02	0.03	0.05	0.04	0.04
Nitrite (as NO_2)	1/15	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	11/15	0.16	0.20	0.13	0.20	0.10	0.16		0.30	0.13
	12/8	0.13	0.22	0.13	<0.07	0.07	0.10	0.16	0.13	0.13
Orthophosphate	1/15	2.0	1.5	1.3	1.4	0.14	1.7	0.72	1.5	1.1
		1.9	1.6	1.3	1.4	0.12	1.8	0.72	1.7	1.1
								0.68		0.98
	11/15	0.84	0.46	0.54	0.60	0.29	0.49		0.52	0.55
		0.66	0.46	0.55	0.62	0.30	0.48		0.52	0.55
	12/8	4.1	1.6	0.36	0.28	0.21	2.1	0.49	0.56	0.68
	12/8	4.1	1.6	0.36	0.26	0.24	2.2	0.49	0.56	0.68
Potassium	1/15	6.8	5.1	10.6	10.6	1.8	6.6	3.7	4.6	4.3
								3.5		4.1
	11/15	4.0	3.7	3.1	7.4	1.7	3.5		6.5	3.3
		3.0	3.6	2.5	1.4	1.1	2.2		1.5	1.6
	12/8	10	4.5	1.9	3.1	1.6	7.1	3.1	2.3	3.5
		11	4.0	1.7	1.3	1.2	7.0	3.3	1.7	2.8
Oil and grease	1/15	<1	<1	<1	<1	<1	<1	<1	<1	<1
	11/15	<1	<1	<1	<1	<1	<1		<1	<1
	12/8	<1	<1	<1	1.2	<1	<1	1	<1	<1

Table 7-3. Nonradioactive compounds detected in storm water runoff, Livermore site, 1997 (continued).

Parameter	Storm date	ALPE	ALPO	ASS2	ASW	CDB	CDB2	CDBX	GRNE	WPDC
Miscellaneous (mg/L) (cont'd)										
Sulfate	1/15	68.8	201	208	200	1.9	70.1	20	4.0	47.4
								20.2		47.4
	11/15	2.3	150	2.1	1.2	1.9	2.8		5.7	3.2
	12/8	580	65	2.0	2.0	3.3	228	40	8.3	25
Surfactants	1/15	0.57	0.22	0.18	0.10	0.10	0.17	0.12	0.12	0.17
								0.10		0.19
	11/15	0.11	0.08	0.09	0.09	0.09	0.11		0.09	0.06
	12/8	0.05	0.06	0.06	<0.05	<0.05	0.07	0.05	<0.05	<0.05
Total alkalinity (as $CaCO_3$)	1/15	102	190	190	182	11.4	95.9	57.7	81.9	85.2
								56.3		84.4
	11/15	21	180	14	14	12	19		29	21
	12/8	330	120	20	15	27	150	120	61	89
Total dissolved solids (TDS)	1/15	490	890	740	740	58	470	210	190	340
								200		340
	11/15	62	710	45	62	85	59		98	54
	12/8	2420	412	71.0	51.0	95.0	1020	332	169	203
Total hardness (as $CaCO_3$)	1/15	97.3	306	315	310	19.7	98.5	54.3	64.5	101
								53.6		101
	11/15	22	240	17	15	17	21		46	22
	12/8	590	140	24	30	38	280	150	80	100
Total organic carbon (TOC)	11/15	12	11	15	10	9.1	15		5.1	9.7
	12/8	58	6.8	5.9	4.9	6.7	25	7.9	7.9	6.5
	1/15	21	9.0	13	14	5.2	20	7.1	19	7.6
Total phosphorus (as PO_4)	1/15	0.82	0.66	1.4	1.6	0.15	0.90	0.37	0.73	0.50
								0.37		0.5
	11/15	0.43	0.37	0.30	1.0	0.18	0.37		0.78	0.47
	12/8	1.5	0.57	0.18	0.73	0.11	0.92	0.21	0.25	0.38
Total suspended solids (TSS)	1/15	26	130	606	610	27	190	20	67.5	21
	11/15	155	139	55.0	978	53.0	150		1150	204
	12/8	46	91	61	306	29	87	17	170	120
pH (pH units)	1/15	7.99	8.26	8.26	8.24	7.41	7.98	7.72	7.87	8.02
								7.76		8.04
	11/15	6.85	8.07	6.45	6.72	6.83	6.71		7.64	6.92
	12/8	8.33	8.13	7.34	7.21	7.45	8.21	7.88	7.98	7.96

Table 7-3. Nonradioactive compounds detected in storm water runoff, Livermore site, 1997 (concluded).

Parameter	Storm date	ALPE	ALPO	ASS2	ASW	CDB	CDB2	CDBX	GRNE	WPDC
Miscellaneous (mg/L) (cont'd)										
Specific conductance (µmho/cm)	1/15	673	1420	1090	1060	55.0	680	270	206	498
								271		498
	11/15	85	1200	54	43	54	67		150	78.0
	12/8	3810	671	71.0	92.0	118	1670	597	248	425
Bioassay (%)										
Aquatic bioassay, survival	5/23									83
Aquatic bioassay, survival	12/8	100	100	90					100	100
EPA Method 507 (µg/L)										
Benzo[*a*]pyrene	1/15				<0.1					0.15
	11/15	<0.1	<0.1	<0.1		<0.1	<0.1		<0.1	
	11/15				<0.1					<0.1
Bromacil	1/15				1.3					9.8
	11/15	6.3	13	18	2.2	260	70		1200	15
	12/8	0.93	13	4.0	8.4	27	21	39	84	27
Diazinon	11/15	<0.2	<0.2	<0.2		<0.2	<0.2		0.24	
	11/15				<0.2					<0.2
	12/8	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bis(2-ethylhexyl)phthalate	1/15				3.2					<3.0
	11/15	<3	<3	<3		<3	<3		<3	
	11/15				<3					<3
Simazine	1/15				2.3					2.3
	11/15	<0.2	7.5	2.6		<0.2	<0.2		6.8	0.21
	11/15				<0.2					
	12/8	<0.2	71	3.8	8.3	<0.2	<0.2	<0.2	6.0	6.7
Diuron	1/15				<1					2
	11/15	4.6	20	16	2.4	200	140		320	23
	12/8	<1	47	1.2	29	37	5.6	40	11	25

Table 7-4. Summary of nondetects in storm water runoff, for Livermore site nonradioactive parameters.

Parameter	Number of samples	Reporting limit
Metals and minerals and others (mg/L)		
Carbonate alkalinity (as $CaCO_3$)	26	<2.6
EPA Method 507 (µg/L)		
Atraton	2	<1
Diazinon	2	<0.2
Molinate	2	<1
Prometon	2	<1
Prometryne	2	<1
Secbumeton	2	<1
Terbutryn	2	<1
Thiobencarb	2	<1
Acenaphthylene	10	<0.1
Alachlor	10	<2
Aldrin	8	<0.5
Anthracene	10	<0.1
Atraton	8	<0.5
Atrazine	19	<0.2
Benzo[*a*]anthracene	10	<0.3
Benzo[*b*]fluoranthene	10	<0.3
Benzo[*g,h,i*]perylene	10	<0.3
Benzo[*k*]fluoranthene	10	<0.3
BHC, delta isomer	10	<0.3
BHC, gamma isomer (Lindane)	10	<0.1
Butachlor	17	<0.4
Butylbenzylphthalate	10	<1
Chlordane	8	<2
Chrysene	10	<0.3
Di(2-ethylhexyl)adipate	10	<1
Dibenzo[*a,h*]anthracene	10	<0.3
Dibutylphthalate	10	<1
Diethylphthalate	8	<3
Dimethoate	19	<2
Dimethylphthalate	10	<1
Endrin	8	<0.2
Fluorene	10	<0.1

Table 7-4. Summary of nondetects in storm water runoff, for Livermore site nonradioactive parameters (concluded).

Parameter	Number of samples	Reporting limit
EPA Method 507 (µg/L) (cont'd)		
Heptachlor	8	<0.1
Heptachlor epoxide	8	<0.1
Hexachlorobenzene	10	<0.5
Hexachlorocyclopentadiene	10	<1
Indeno[*1,2,3-c,*d]pyrene	10	<0.3
Methoxychlor	10	<0.5
Metolachlor	19	<0.5
Metribuzin	19	<0.5
Molinate	17	<0.5
Pentachlorophenol	8	<1
Phenanthrene	10	<0.1
Prometon	8	<0.5
Prometryne	17	<0.5
Propachlor	17	<0.5
Pyrene	10	<0.1
Secbumeton	8	<0.5
Terbutryn	8	<0.5
Thiobencarb	17	<0.5
Toxaphene	8	<5
EPA Method 547 (µg/L)		
Glyphosate	19	<35

Table 7-5. Tritium in rain (Bq/L), Livermore site and Livermore Valley.

Location	Date			
	1/15/97	11/3/97	11/7/97	11/16-17/1997
Livermore site				
B343	<2.479 ± 2.479	<1.295 ± 1.295	38.48 ± 2.34728	35.964 ± 2.2644
B291	<2.405 ± 2.405	<1.2987 ± 1.2987	12.321 ± 1.73726	11.433 ± 2.3458
CDB	<2.5086 ± 2.5086	<1.2876 ± 1.2876	14.615 ± 3.37607	14.652 ± 1.7279
VIS	<2.3865 ± 2.3865	<1.2543 ± 1.2543	15.725 ± 1.8241	4.514 ± 1.43
COW	<2.479 ± 2.479	<1.2321 ± 1.2321	4.773 ± 1.50827	5.032 ± 1.4245
SALV	<2.5012 ± 2.5012	<1.3283 ± 1.3283	<2.8379 ± 2.8379	3.32 ± 1.38
MET	<2.442 ± 2.442	1.6576 ± 1.344314	<1.3764 ± 1.3764	5.809 ± 1.4504
Livermore Valley				
ESAN	<2.4235 ± 2.4235	—[a]	—[a]	2.5123 ± 1.3394
ZON7	<2.4938 ± 2.4938	—[a]	—[a]	2.9415 ± 1.3505
AQUE	<2.4864 ± 2.4864	—[a]	—[a]	2.0054 ± 1.3172
SLST	<2.4642 ± 2.4642	—[a]	—[a]	1.4171 ± 1.3135
GTES	<1.0656 ± 1.0656	—[a]	—[a]	1.739 ± 1.1914
VINE	1.7242 ± 1.136248	—[a]	—[a]	1.7575 ± 1.1988
BVA	2.6307 ± 2.522841	—[a]	—[a]	2.2237 ± 1.369
VET	9.731 ± 2.763604	—[a]	—[a]	1.8685 ± 1.3394

Location	Date			
	11/20/97	11/26/97	12/5/97	12/8/97
Livermore site				
B343	65.12 ± 3.127	38.11 ± 2.438	26.418 ± 3.27	48.47 ± 2.23
B291	9.694 ± 1.795	3.05 ± 1.41	6.623 ± 1.87	3.885 ± 1.08
CDB	—[b]	10.249 ± 1.672	3.2708 ± 2.30	24.827 ± 1.71
VIS	16.539 ± 2.002	3.811 ± 1.425	<1.517 ± 1.52	6.919 ± 1.72
COW	4.699 ± 1.613	3.959 ± 1.447	3.3226 ± 2.25	10.286 ± 1.86
SALV	3.885 ± 1.595	<1.2543 ± 1.254	—[b]	3.478 ± 1.49
MET	2.55 ± 1.06	<1.295 ± 1.295	4.44 ± 1.65	<1.4726 ± 1.4726
Livermore Valley				
ESAN	—[a]	—[a]	—[a]	<0.9213 ± 0.9213
ZON7	—[a]	—[a]	—[a]	1.8796 ± 1.55
AQUE	—[a]	—[a]	—[a]	1.0027 ± 0.98
SLST	—[a]	—[a]	—[a]	<1.4874 ± 1.4874
GTES	—[a]	—[a]	—[a]	<0.9139 ± 0.9139
VINE	—[a]	—[a]	—[a]	<0.8917 ± 0.8917
BVA	—[a]	—[a]	—[a]	<0.9176 ± 0.9176
VET	—[a]	—[a]	—[a]	<0.9213 ± 0.9213

[a] As part of a special study, on-site locations only were sampled on these dates.

[b] Samples not collected at this location due to error.

Table 7-6. Compliance monitoring data for the four releases from the DRB sampled in 1997.

Parameter	CDBX				WPDC			
	1/15	09/17	11/26	12/08	01/15	09/17	11/26	12/08
Dissolved general minerals (mg/L)								
Aluminum	0.53	na	na	<0.05	0.37	na	na	<0.05
Bicarbonate alkalinity (as $CaCO_3$)	57.7	na	na	na	85.2	na	na	na
Calcium	13	na	na	34	24	na	na	25
Carbonate alkalinity (as $CaCO_3$)	<1	na	na	na	<1	na	na	na
Chloride	28.1	na	na	na	61.5	na	na	na
Copper	<0.01	na	na	<0.01	<0.01	na	na	<0.01
Fluoride	0.13	na	na	na	0.27	na	na	na
Hydroxide alkalinity (as $CaCO_3$)	<1	na	na	na	<1	na	na	na
Iron	0.41	na	na	<0.05	0.29	na	na	<0.05
Magnesium	5.3	na	na	15	9.9	na	na	10
Manganese	<0.01	na	na	0.016	<0.01	na	na	0.01
Nickel	<0.05	na	na	<0.05	<0.05	na	na	<0.05
Nitrate (as N)	0.6	na	na	na	1.2	na	na	na
Nitrate (as NO_3)	2.7	na	na	na	5.3	na	na	na
Nitrite (as N)	<0.1	na	na	na	<0.1	na	na	na
pH (pH units)	7.72	na	na	na	8.02	na	na	na
Orthophosphate	0.72	na	na	na	1.1	na	na	na
Potassium	3.7	na	na	3.3	4.3	na	na	2.8
Specific conductance (µmho/cm)	270	na	na	na	498	na	na	na
Sodium	31	na	na	75	56	na	na	50
Sulfate	20	na	na	na	47.4	na	na	na
Surfactants	0.12	na	na	na	0.17	na	na	na
Total alkalinity (as $CaCO_3$)	57.7	na	na	na	85.2	na	na	na
Total dissolved solids (TDS)	210	na	na	na	335	na	na	na
Total hardness (as $CaCO_3$)	54.3	na	na	na	101	na	na	na
Total phosphorus (as PO_4)	0.37	na	na	na	0.5	na	na	na
Zinc	0.017	na	na	0.04	0.02	na	na	0.064
Total general minerals (mg/L)								
Aluminum	3.7	0.4	1.1	1.1	3.8	na	7.4	7.3
Bicarbonate alkalinity (as $CaCO_3$)	56.3	154	180	120	84.4	na	80	89
Calcium	12.9	44	34	30	24	na	24	25
Carbonate alkalinity (as $CaCO_3$)	<1	<1	<1	<1	<1	na	<1	<1
Chloride	28	96.3	81	83	61.2	na	42	52
Copper	<0.01	<0.01	<0.01	<0.01	<0.01	na	0.013	0.013
Fluoride	0.12	0.28	0.28	0.23	0.25	na	0.22	0.2
Hydroxide alkalinity (as $CaCO_3$)	<1	<1	<1	<1	<1	na	<1	<1

Table 7-6. Compliance monitoring data for the four releases from the DRB sampled in 1997 (continued).

Parameter	CDBX				WPDC			
	1/15	09/17	11/26	12/08	01/15	09/17	11/26	12/08
Total general minerals (mg/L) (continued)								
Iron	3.2	0.38	1.4	1.3	3.2	na	8.3	7.9
Magnesium	5.2	18	15	14	9.9	na	10	11
Manganese	0.051	0.082	0.07	0.061	0.052	na	0.12	0.13
Nickel	<0.05	<0.05	<0.05	<0.05	<0.05	na	<0.05	<0.05
Nitrate (as N)	0.6	<0.1	0.6	0.74	1.2	na	1.1	1.3
Nitrate (as NO_3)	2.7	<0.4	2.7	3.3	5.3	na	4.9	5.8
Nitrite (as N)	<0.1	<0.02	0.04	0.05	<0.1	na	0.02	0.04
Orthophosphate	0.68	9.12	8.13	0.49	0.98	na	7.95	0.68
pH (pH units)	7.76	1.3	0.63	7.88	8.04	na	0.71	7.96
Potassium	3.5	4.5	3.3	3.1	4.1	na	4	3.5
Sodium	31	710	590	65	57	na	361	44
Specific conductance (µmho/cm)	271	89	58	597	498	na	35	425
Sulfate	20.2	35.2	31	40	47.4	na	19	25
Surfactants	0.1	<0.05	<0.05	0.05	0.19	na	<0.05	<0.05
Total alkalinity (as $CaCO_3$)	56.3	154	180	120	84.4	na	80	89
Total dissolved solids (TDS)	200	414	345	332	345	na	222	203
Total hardness (as $CaCO_3$)	53.6	184	150	150	101	na	100	100
Total phosphorus (as PO_4)	0.37	0.52	0.2	0.21	0.5	na	0.41	0.38
Total suspended solids	20	2.1	36	17	21	27.5	129	121
Zinc	0.086	<0.05	0.044	0.038	0.082	na	0.1	0.17
Anions (mg/L)								
Bicarbonate alkalinity (as $CaCO_3$)	59.2	na	na	120	86	na	na	88
Bromide	0.05	na	na	0.29	0.16	na	na	0.16
Carbonate alkalinity (as $CaCO_3$)	<1	na	na	<2.6	<1	na	na	<2.6
Chloride	28.3	na	na	83	60.8	na	na	52
Fluoride	0.14	na	na	0.24	0.26	na	na	0.2
Nitrate (as N)	0.6	na	na	0.74	1.2	na	na	1.3
Nitrate (as NO_3)	2.7	na	na	3.3	5.3	na	na	5.8
Nitrite (as N)	<0.1	na	na	0.05	<0.1	na	na	0.04
Nitrite (as NO_2)	<0.2	na	na	0.16	<0.2	na	na	0.13
Orthophosphate	0.72	na	na	0.49	1.1	na	na	0.68
Sulfate	20.2	na	na	40	47.2	na	na	25

Table 7-6. Compliance monitoring data for the four releases from the DRB sampled in 1997 (continued).

Parameter	CDBX				WPDC			
	1/15	09/17	11/26	12/08	01/15	09/17	11/26	12/08
Dissolved metals (mg/L)								
Aluminum	0.45	na	na	<0.05	0.45	na	7	<0.05
Antimony	<0.01	na	na	<0.004	<0.01	na	<0.004	<0.004
Arsenic	0.002	na	na	0.0024	0.003	na	<0.004	<0.002
Barium	0.079	na	na	0.11	0.1	na	0.14	0.1
Beryllium	<0.0002	na	na	<0.0002	<0.0002	na	0.0003	<0.0002
Boron	0.93	na	na	1.6	1.4	na	0.57	0.91
Cadmium	0.001	na	na	<0.0005	<0.0005	na	<0.0005	<0.0005
Chromium	0.003	na	na	<0.001	0.002	na	0.018	0.0014
Cobalt	<0.05	na	na	<0.05	<0.05	na	<0.05	<0.05
Copper	0.004	na	na	0.0071	0.005	na	0.025	0.0062
Iron	0.36	na	na	<0.05	0.35	na	7.7	<0.05
Lead	<0.005	na	na	<0.005	<0.005	na	0.0068	<0.005
Manganese	<0.01	na	na	<0.01	0.011	na	0.13	<0.01
Mercury	<0.0002	na	na	<0.0002	<0.0002	na	<0.0002	<0.0002
Molybdenum	<0.025	na	na	<0.025	<0.025	na	<0.025	<0.025
Nickel	<0.002	na	na	0.0035	<0.002	na	0.023	0.0036
Selenium	<0.02	na	na	<0.002	<0.02	na	<0.005	<0.002
Silver	<0.001	na	na	<0.001	<0.001	na	<0.001	<0.001
Thallium	<0.001	na	na	<0.001	<0.001	na	<0.001	<0.001
Vanadium	<0.01	na	na	<0.01	<0.01	na	0.019	<0.01
Zinc	0.021	na	na	<0.02	0.033	na	0.105	0.087
Total metals (mg/L)								
Aluminum	4	0.4	1.2	1.5	3.8	na	na	5.2
Antimony	<0.004	<0.004	<0.004	<0.004	<0.005	na	na	<0.004
Arsenic	0.003	0.0072	<0.004	0.0025	0.0029	na	na	0.0024
Barium	0.088	0.12	0.12	0.11	0.1	na	na	0.14
Beryllium	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	na	na	<0.0002
Boron	0.89	1.4	1	1.4	1.3	na	na	0.8
Cadmium	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	na	na	0.0005
Chromium	0.0087	0.0021	0.0054	0.0059	0.0078	na	na	0.016
Cobalt	<0.05	<0.05	<0.05	<0.05	<0.05	na	na	<0.05
Copper	0.0073	0.0026	0.043	0.005	0.0071	na	na	0.017
Chromium(VI)	0.002	<0.01	0.006	<0.002	0.003	na	0.01	<0.002
Iron	3.3	0.41	1.5	1.7	3.2	na	na	5.9
Lead	<0.005	<0.005	<0.005	<0.005	<0.005	na	na	<0.005

Table 7-6. Compliance monitoring data for the four releases from the DRB sampled in 1997 (continued).

Parameter	CDBX				WPDC			
	1/15	09/17	11/26	12/08	01/15	09/17	11/26	12/08
Total metals (mg/L) (continued)								
Manganese	0.05	0.082	0.073	0.067	0.051	na	na	0.12
Mercury	<0.00025	<0.0002	<0.0002	<0.0002	<0.00025	na	na	<0.0002
Molybdenum	<0.025	<0.05	<0.025	<0.025	<0.025	na	na	<0.025
Nickel	0.014	<0.01	0.011	0.008	0.0095	na	na	0.024
Selenium	<0.002	<0.005	<0.005	<0.002	<0.002	na	na	<0.002
Silver	<0.001	<0.001	<0.001	<0.001	<0.001	na	na	<0.001
Thallium	<0.001	<0.001	<0.001	<0.001	<0.001	na	na	<0.001
Vanadium	0.01	0.015	<0.01	<0.01	0.012	na	na	0.015
Zinc	0.049	<0.05	0.037	0.036	0.058	na	na	0.24
Miscellaneous organics (mg/L)								
Chemical oxygen demand	41	32	25	28	46	na	28	24
Oil and grease	<1	<1	<1	<1	<1	na	<1	<1
Total organic carbon (TOC)	7.1	8.3	7.7	7.9	7.6	na	7.4	6.5
Total petroleum hydrocarbons (µg/L)								
Diesel fuel	na	<50	81	na	na	na	95	na
1,2-Dibromo-3-chloropropane	na		<0.01	na	na	na	<0.01	na
Ethylene dibromide	na	<0.01	<0.01	na	na	na	<0.01	na
Gasoline fingerprint	na	<50	<50	na	na	na	<50	na
Volatile organic compounds (µg/L)								
1,1,1-Trichloroethane	na	<0.5	<0.5	na	na	na	<0.5	na
1,1,2,2-Tetrachloroethane	na	<0.5	<0.5	na	na	na	<0.5	na
1,1,2-Trichloroethane	na	<0.5	<0.5	na	na	na	<0.5	na
1,1-Dichloroethane	na	<0.5	<0.5	na	na	na	<0.5	na
1,1-Dichloroethene	na	<0.5	<0.5	na	na	na	<0.5	na
1,2-Dichlorobenzene	na	<0.5	<0.5	na	na	na	<0.5	na
1,2-Dichloroethane	na	<0.5	<0.5	na	na	na	<0.5	na
1,2-Dichloroethene (total)	na	<1	<1	na	na	na	<1	na
1,2-Dichloropropane	na	<0.5	<0.5	na	na	na	<0.5	na
1,3-Dichlorobenzene	na	<0.5	<0.5	na	na	na	<0.5	na
1,4-Dichlorobenzene	na	<0.5	<0.5	na	na	na	<0.5	na
Benzene	na	<0.5	<0.5	na	na	na	<0.5	na
Bromodichloromethane	na	<0.5	<0.5	na	na	na	<0.5	na
Bromoform	na	<0.5	<0.5	na	na	na	<0.5	na
Bromomethane	na	<0.5	<0.5	na	na	na	<0.5	na

Table 7-6. Compliance monitoring data for the four releases from the DRB sampled in 1997 (continued).

Parameter	CDBX				WPDC			
	1/15	09/17	11/26	12/08	01/15	09/17	11/26	12/08
Volatile organic compounds (µg/L) (continued)								
Carbon tetrachloride	na	<0.5	<0.5	na	na	na	<0.5	na
Chlorobenzene	na	<0.5	<0.5	na	na	na	<0.5	na
Chloroethane	na	<1	<1	na	na	na	<1	na
Chloroform	na	<0.5	<0.5	na	na	na	<0.5	na
Chloromethane	na	<1	<1	na	na	na	<1	na
cis-1,2-Dichloroethene	na	<0.5	<0.5	na	na	na	<0.5	na
cis-1,3-Dichloropropene	na	<0.5	<0.5	na	na	na	<0.5	na
Dibromochloromethane	na	<0.5	<0.5	na	na	na	<0.5	na
Dichlorodifluoromethane	na	<0.5	<0.5	na	na	na	<0.5	na
Ethylbenzene	na	<0.5	<0.5	na	na	na	<0.5	na
Freon 113	na	<0.5	<0.5	na	na	na	<0.5	na
m- and *p*-Xylene isomers	na	<0.5	na	na	na	na	na	na
Methylene chloride	na	<1	<1	na	na	na	<1	na
o-Xylene	na	<0.5	na	na	na	na	na	na
Tetrachloroethene	na	<0.5	<0.5	na	na	na	<0.5	na
Toluene	na	<0.5	<0.5	na	na	na	<0.5	na
Total trihalomethanes	na	<2	<2	na	na	na	<2	na
Total xylene isomers	na	<1	<1	na	na	na	<1	na
trans-1,2-Dichloroethene	na	<0.5	<0.5	na	na	na	<0.5	na
trans-1,3-Dichloropropene	na	<0.5	<0.5	na	na	na	<0.5	na
Trichloroethene	na	<0.5	<0.5	na	na	na	<0.5	na
Trichlorofluoromethane	na	<0.5	<0.5	na	na	na	<0.5	na
Vinyl chloride	na	<0.5	<0.5	na	na	na	<0.5	na
Semivolatile organic compounds (µg/L)								
1,2,4-Trichlorobenzene	na	<2	<2	na	na	na	<2	na
1,2-Dichlorobenzene	na	<2	<2	na	na	na	<2	na
1,2-Diphenylhydrazine	na	<2	<2	na	na	na	<2	na
1,3-Dichlorobenzene	na	<2	<2	na	na	na	<2	na
1,4-Dichlorobenzene	na	<2	<2	na	na	na	<2	na
2,4,5-Trichlorophenol	na	<5	<5	na	na	na	<5	na
2,4,6-Trichlorophenol	na	<5	<5	na	na	na	<5	na
2,4-Dichlorophenol	na	<2	<2	na	na	na	<2	na
2,4-Dimethylphenol	na	<2	<2	na	na	na	<2	na
2,4-Dinitrophenol	na	<10	<10	na	na	na	<10	na

Table 7-6. Compliance monitoring data for the four releases from the DRB sampled in 1997 (continued).

Parameter	CDBX				WPDC			
	1/15	09/17	11/26	12/08	01/15	09/17	11/26	12/08
Semivolatile organic compounds (µg/L) (continued)								
2,4-Dinitrotoluene	na	<2	<2	na	na	na	<2	na
2,6-Dinitrotoluene	na	<2	<2	na	na	na	<2	na
2-Chloronaphthalene	na	<2	<2	na	na	na	<2	na
2-Chlorophenol	na	<2	<2	na	na	na	<2	na
2-Methyl-4,6-dinitrophenol	na	<10	<10	na	na	na	<10	na
2-Methylnaphthalene	na	<2	<2	na	na	na	<2	na
2-Naphthylamine	na	<20	<20	na	na	na	<20	na
2-Nitroaniline	na	<2	<2	na	na	na	<2	na
2-Nitrophenol	na	<2	<2	na	na	na	<2	na
3,3-Dichlorobenzidine	na	<5	<5	na	na	na	<5	na
3-Nitroaniline	na	<2	<2	na	na	na	<2	na
4-Bromophenylphenylether	na	<2	<2	na	na	na	<2	na
4-Chloro-3-methylphenol	na	<5	<5	na	na	na	<5	na
4-Chloroaniline	na	<2	<2	na	na	na	<2	na
4-Chlorophenylphenylether	na	<2	<2	na	na	na	<2	na
4-Nitroaniline	na	<5	<5	na	na	na	<5	na
4-Nitrophenol	na	<5	<5	na	na	na	<5	na
Acenaphthene	na	<2	<2	na	na	na	<2	na
Acenaphthylene	na	<2	<2	na	na	na	<2	na
Aldrin	na	<2	<2	na	na	na	<2	na
Aniline	na	<5	<5	na	na	na	<5	na
Anthracene	na	<2	<2	na	na	na	<2	na
Benzidine	na	<20	<20	na	na	na	<20	na
Benzo*[a]*anthracene	na	<2	<2	na	na	na	<2	na
Benzo*[a]*pyrene	na	<2	<2	na	na	na	<2	na
Benzo*[b]*fluoranthene	na	<2	<2	na	na	na	<2	na
Benzo*[g,h,i]*perylene	na	<2	<2	na	na	na	<2	na
Benzo*[k]*fluoranthene	na	<2	<2	na	na	na	<2	na
Benzoic acid	na	<10	<10	na	na	na	<10	na
Benzyl alcohol	na	<2	<2	na	na	na	<2	na
BHC, alpha isomer	na	<2	<2	na	na	na	<2	na
BHC, beta isomer	na	<2	<2	na	na	na	<2	na
BHC, delta isomer	na	<2	<2	na	na	na	<2	na
BHC, gamma isomer (Lindane)	na	<2	<2	na	na	na	<2	na

Table 7-6. Compliance monitoring data for the four releases from the DRB sampled in 1997 (continued).

Parameter	CDBX				WPDC			
	1/15	09/17	11/26	12/08	01/15	09/17	11/26	12/08
Semivolatile organic compounds (µg/L) (continued)								
Bis(2-chloroethoxy)methane	na	<2	<2	na	na	na	<2	na
Bis(2-chloroethyl)ether	na	<2	<2	na	na	na	<2	na
Bis(2-chloroisopropyl)ether	na	<2	<2	na	na	na	<2	na
Bis(2-ethylhexyl)phthalate	na	<5	<5	na	na	na	<5	na
Butylbenzylphthalate	na	<2	<2	na	na	na	<2	na
Chrysene	na	<2	<2	na	na	na	<2	na
Di-*n*-octylphthalate	na	<2	<2	na	na	na	<2	na
Dibenzo*[a,h]*anthracene	na	<3	<3	na	na	na	<3	na
Dibenzofuran	na	<2	<2	na	na	na	<2	na
Dibutylphthalate	na	<2	<2	na	na	na	<2	na
Dieldrin	na	<3	<3	na	na	na	<3	na
Diethylphthalate	na	<2	<2	na	na	na	<2	na
Dimethylphthalate	na	<2	<2	na	na	na	<2	na
Endosulfan I	na	<10	<10	na	na	na	<10	na
Endosulfan II	na	<10	<10	na	na	na	<10	na
Endosulfan sulfate	na	<3	<3	na	na	na	<3	na
Endrin	na	<2	<2	na	na	na	<2	na
Endrin aldehyde	na	<2	<2	na	na	na	<2	na
Fluoranthene	na	<2	<2	na	na	na	<2	na
Fluorene	na	<2	<2	na	na	na	<2	na
Heptachlor	na	<2	<2	na	na	na	<2	na
Heptachlor epoxide	na	<2	<2	na	na	na	<2	na
Hexachlorobenzene	na	<2	<2	na	na	na	<2	na
Hexachlorobutadiene	na	<2	<2	na	na	na	<2	na
Hexachlorocyclopentadiene	na	<2	na	na	na	na	na	na
Hexachloroethane	na	<2	<2	na	na	na	<2	na
Indeno[1,2,3-*c,d*]pyrene	na	<2	<2	na	na	na	<2	na
Isophorone	na	<2	<2	na	na	na	<2	na
N-Nitrosodi-*n*-propylamine	na	<2	<2	na	na	na	<2	na
N-Nitrosodimethylamine	na	<2	<2	na	na	na	<2	na
N-Nitrosodiphenylamine	na	<2	<2	na	na	na	<2	na
Naphthalene	na	<2	<2	na	na	na	<2	na
Nitrobenzene	na	<2	<2	na	na	na	<2	na
o-Cresol	na	<2	<2	na	na	na	<2	na

Table 7-6. Compliance monitoring data for the four releases from the DRB sampled in 1997 (continued).

Parameter	CDBX				WPDC			
	1/15	09/17	11/26	12/08	01/15	09/17	11/26	12/08
Semivolatile organic compounds (µg/L) (continued)								
p,p'-DDD	na	<2	<2	na	na	na	<2	na
p,p'-DDE	na	<3	<3	na	na	na	<3	na
p,p'-DDT	na	<2	<2	na	na	na	<2	na
p-Cresol	na	<2	<2	na	na	na	<2	na
Pentachlorophenol	na	<10	<10	na	na	na	<10	na
Phenanthrene	na	<2	<2	na	na	na	<2	na
Phenol	na	<2	<2	na	na	na	<2	na
Pyrene	na	<2	<2	na	na	na	<2	na
Herbicides (µg/L)								
Acenaphthylene	na	na	na	na	<0.1	na	na	na
Alachlor	na	na	na	na	<0.2	na	na	na
Anthracene	na	na	na	na	<0.1	na	na	na
Atraton	na	na	na	na	<1	na	na	na
Atrazine	na	na	na	<0.2	<0.2	na	na	na
Benzo*[a]*anthracene	na	na	na	na	<0.3	na	na	na
Benzo*[a]*pyrene	na	na	na	na	0.15	na	na	na
Benzo*[b]*fluoranthene	na	na	na	na	<0.3	na	na	na
Benzo*[g,h,i]*perylene	na	na	na	na	<0.3	na	na	na
Benzo*[k]*fluoranthene	na	na	na	na	<0.3	na	na	na
Hexachlorocyclohexane (BHC), delta isomer	na	na	na	na	<0.2	na	na	na
Hexachlorocyclohexane (BHC), gamma isomer (Lindane)	na	na	na	na	<0.1	na	na	na
Bromacil	na	na	na	39	9.8	na	na	na
Butachlor	na	na	na	<0.4	na	na	na	na
Butylbenzylphthalate	na	na	na	na	<1	na	na	na
Chrysene	na	na	na	na	<0.3	na	na	na
Di(2-ethylhexyl)adipate	na	na	na	na	<1	na	na	na
Diazinon	na	na	na	<0.2	<0.2	na	na	na
Dibenzo(a,h)anthracene	na	na	na		<0.3	na	na	na
Dibutylphthalate	na	na	na		<1	na	na	na
Diethylhexylphthalate	na	na	na		<3	na	na	na
Dimethoate	na	na	na	<2	<1	na	na	na
Dimethylphthalate	na	na	na		<1	na	na	na

Table 7-6. Compliance monitoring data for the four releases from the DRB sampled in 1997 (concluded).

Parameter	CDBX				WPDC			
	1/15	09/17	11/26	12/08	01/15	09/17	11/26	12/08
Herbicides (µg/L) (continued)								
Diuron	na	na	na	40	2	na	na	25
Fluorene	na	na	na	na	<0.1	na	na	na
Glyphosate	na	na	na	<9	<20	na	na	<9
Hexachlorobenzene	na	na	na	na	<0.5	na	na	na
Hexachlorocyclopentadiene	na	na	na	na	<1	na	na	na
Indeno(1,2,3-*c,d*)pyrene	na	na	na	na	<0.3	na	na	na
Methoxychlor	na	na	na	na	<0.5	na	na	na
Metolachlor	na	na	na	<0.5	<1	na	na	<0.5
Metribuzin	na	na	na	<0.5	<1	na	na	<0.5
Molinate	na	na	na	<0.5	<1	na	na	<0.5
Phenanthrene	na	na	na	na	<0.1	na	na	na
Prometon	na	na	na	na	<1	na	na	na
Prometryne	na	na	na	<0.5	<1	na	na	<0.5
Pyrene	na	na	na	na	<0.1	na	na	na
Secbumeton	na	na	na	na	<1	na	na	na
Simazine	na	na	na	<0.2	2.3	na	na	<0.2
Terbutryn	na	na	na	na	<1	na	na	na
Thiobencarb	na	na	na	<0.5	<1	na	na	<0.5
Toxicity								
Aquatic bioassay, survival (%)	na	100	100	na	na	100	100	100
Radioactivity (Bq/L)								
Gross alpha	<0.044	na	na	0.06	<0.024	na	na	<0.08
Gross beta	<0.1	na	na	0.21	<0.019	na	na	<0.1
Tritium	20.3	na	21.5	21.1	13.4	na	7.44	15.8

na = Not analyzed.

Table 7-7a. Monthly analyses of water samples collected from the Drainage Retention Basin at sample location CDBE.

Parameter	1/27	2/3	2/10	2/18	2/24	3/4
General minerals (mg/L)						
Aluminum	4.4	na	3.2	na	na	2
Bicarbonate alkalinity (as $CaCO_3$)	63.4	na	70.6	na	na	77.7
Calcium	14.8	na	14.7	na	na	15.9
Carbonate alkalinity (as $CaCO_3$)	<1	na	<1	na	na	<1
Chloride	25.2	na	26.3	na	na	27.4
Copper	<0.01	na	<0.01	na	na	<0.01
Fluoride	0.12	na	0.12	na	na	0.12
Hydroxide alkalinity (as $CaCO_3$)	<1	na	<1	na	na	<1
Iron	4.5	na	2.5	na	na	1.8
Magnesium	5	na	6.2	na	na	6.4
Manganese	0.069	na	0.029	na	na	0.019
Nickel	<0.05	na	<0.05	na	na	<0.05
Nitrate (as N)	0.4	na	0.5	na	na	0.5
Nitrate (as NO_3)	1.8	na	2.2	na	na	2.2
Nitrite (as N)	<0.1	na	<0.1	na	na	<0.1
Orthophosphate	1.2	na	1.4	na	na	1.4
pH (pH units)	7.71	na	7.67	na	na	7.95
Potassium	4.5	na	4.6	na	na	4.7
Sodium	32	na	32	na	na	36
Specific conductance (µmho/cm)	279	na	287	na	na	295
Sulfate	20	na	19.8	na	na	20.7
Surfactants	0.06	na	0.08	na	na	0.09
Total alkalinity (as $CaCO_3$)	63.4	na	70.6	na	na	77.7
Total dissolved solids (TDS)	200	na	214	na	na	216
Total hardness (as $CaCO_3$)	57.5	na	62.2	na	na	66
Total phosphorus (as PO_4)	0.66	na	0.57	na	na	0.64
Total suspended solids (TSS)	22.5	na	na	na	na	1.7
Zinc	0.05	na	0.053	na	na	0.13
Nutrients (mg/L)						
Ammonia nitrogen (as N)	0.06	na	0.12	na	na	0.05
Nitrate (as N)	0.5	na	0.5	na	na	0.5
Nitrate (as NO_3)	2.2	na	2.2	na	na	2.2
Nitrite (as N)	<0.1	na	<0.1	na	na	<0.1
Nitrite (as NO_2)	<0.2	na	<0.2	na	na	<0.2
Total Kjeldahl nitrogen	1.3	na	1.2	na	na	1.1
Orthophosphate	na	1.6	na	1.5	2.1	na
Total phosphorus (as PO_4)	na	1.7	na	0.62	0.62	na

Table 7-7a. Monthly analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (continued).

Parameter	1/27	2/3	2/10	2/18	2/24	3/4
Total metals (mg/L)						
Aluminum	4	na	2.6	na	na	2.2
Antimony	<0.004	na	<0.004	na	na	<0.004
Arsenic	0.0028	na	0.0021	na	na	0.0024
Barium	0.1	na	0.088	na	na	0.081
Beryllium	0.00022	na	<0.0002	na	na	<0.0002
Boron	0.83	na	1	na	na	0.74
Cadmium	<0.0005	na	<0.0005	na	na	<0.0005
Chromium	0.013	na	0.0014	na	na	0.0048
Cobalt	<0.05	na	<0.05	na	na	<0.05
Copper	0.011	na	0.0062	na	na	0.0046
Chromium(VI)	0.002	na	<0.002	na	na	0.018
Iron	4.2	na	2.1	na	na	2
Lead	<0.005	na	<0.005	na	na	<0.005
Manganese	0.066	na	0.026	na	na	0.02
Mercury	<0.0002	na	<0.0002	na	na	<0.0002
Molybdenum	<0.025	na	<0.025	na	na	<0.025
Nickel	0.015	na	0.012	na	na	0.0091
Selenium	<0.005	na	<0.002	na	na	<0.002
Silver	<0.001	na	<0.001	na	na	<0.001
Thallium	<0.001	na	<0.001	na	na	<0.001
Vanadium	0.01	na	<0.01	na	na	<0.01
Zinc	0.073	na	0.046	na	na	0.14
Organics						
Chlorophyll-a (µg/L)	1.55	na	2.72	na	na	4.33

Table 7-7a. Monthly analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (continued).

Parameter	3/10	3/17	3/24	4/7	4/18	4/24
General minerals (mg/L)						
Aluminum	na	na	na	2.1	na	na
Bicarbonate alkalinity (as $CaCO_3$)	na	na	na	77	na	na
Calcium	na	na	na	17.6	na	na
Carbonate alkalinity (as $CaCO_3$)	na	na	na	<1	na	na
Chloride	na	na	na	29.9	na	na
Copper	na	na	na	<0.01	na	na
Fluoride	na	na	na	0.14	na	na
Hydroxide alkalinity (as $CaCO_3$)	na	na	na	<1	na	na
Iron	na	na	na	1.9	na	na
Magnesium	na	na	na	7.1	na	na
Manganese	na	na	na	0.022	na	na
Nickel	na	na	na	<0.05	na	na
Nitrate (as N)	na	na	na	0.4	na	na
Nitrate (as NO_3)	na	na	na	1.8	na	na
Nitrite (as N)	na	na	na	<0.02	na	na
Orthophosphate	na	na	na	1.5	na	na
pH (pH units)	na	na	na	8.19	na	na
Potassium	na	na	na	4.4	na	na
Sodium	na	na	na	31	na	na
Specific conductance (µmho/cm)	na	na	na	329	na	na
Sulfate	na	na	na	21.2	na	na
Surfactants	na	na	na	<0.05	na	na
Total alkalinity (as $CaCO_3$)	na	na	na	77	na	na
Total dissolved solids (TDS)	na	na	na	218	na	na
Total hardness (as $CaCO_3$)	na	na	na	73.2	na	na
Total phosphorus (as PO_4)	na	na	na	0.54	na	na
Total suspended solids (TSS)	na	na	na	2.3	na	na
Zinc	na	na	na	0.037	na	na
Nutrients (mg/L)						
Ammonia nitrogen (as N)	na	na	na	0.02	na	na
Nitrate (as N)	na	na	na	0.4	na	na
Nitrate (as NO_3)	na	na	na	1.8	na	na
Nitrite (as N)	na	na	na	<0.02	na	na
Nitrite (as NO_2)	na	na	na	<0.07	na	na
Total Kjeldahl nitrogen	na	na	na	0.8	na	na
Orthophosphate	1.6	1.5	1.3	na	1.1	1.3
Total phosphorus (as PO_4)	0.56	0.53	0.5	na	0.51	0.49

Table 7-7a. Monthly analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (continued).

Parameter	3/10	3/17	3/24	4/7	4/18	4/24
Total metals (mg/L)						
Aluminum	na	na	na	2.31	na	na
Antimony	na	na	na	<0.004	na	na
Arsenic	na	na	na	0.0024	na	na
Barium	na	na	na	0.078	na	na
Beryllium	na	na	na	<0.0002	na	na
Boron	na	na	na	0.86	na	na
Cadmium	na	na	na	<0.0005	na	na
Chromium	na	na	na	0.0077	na	na
Cobalt	na	na	na	<0.05	na	na
Copper	na	na	na	0.0069	na	na
Chromium(VI)	na	na	na	0.002	na	na
Iron	na	na	na	1.9	na	na
Lead	na	na	na	<0.005	na	na
Manganese	na	na	na	0.022	na	na
Mercury	na	na	na	<0.0002	na	na
Molybdenum	na	na	na	<0.025	na	na
Nickel	na	na	na	0.0099	na	na
Selenium	na	na	na	<0.002	na	na
Silver	na	na	na	<0.001	na	na
Thallium	na	na	na	<0.001	na	na
Vanadium	na	na	na	<0.01	na	na
Zinc	na	na	na	0.033	na	na
Organics						
Chlorophyll-a (µg/L)	na	na	na	2.78	na	15.1

Table 7-7a. Monthly analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (continued).

Parameter	4/29	5/7	5/15	5/22	6/10	7/24
General minerals (mg/L)						
Aluminum	na	2.4	na	na	0.79	1.2
Bicarbonate alkalinity (as $CaCO_3$)	na	91	na	na	89.4	113
Calcium	na	20	na	na	22	30
Carbonate alkalinity (as $CaCO_3$)	na	<1	na	na	7.2	12.8
Chloride	na	34	na	na	38.3	68.4
Copper	na	<0.01	na	na	<0.01	<0.01
Fluoride	na	0.19	na	na	0.17	0.27
Hydroxide alkalinity (as $CaCO_3$)	na	<1	na	na	<1	<1
Iron	na	2	na	na	0.75	1.2
Magnesium	na	8.2	na	na	8.8	13
Manganese	na	0.041	na	na	0.077	0.09
Nickel	na	<0.05	na	na	<0.05	<0.05
Nitrate (as N)	na	<0.1	na	na	<0.1	0.4
Nitrate (as NO_3)	na	<0.4	na	na	<0.4	1.8
Nitrite (as N)	na	<0.1	na	na	<0.02	
Orthophosphate	na	1.2	na	na	1.2	0.82
pH (pH units)	na	7.24	na	na	8.43	8.68
Potassium	na	4	na	na	3.4	4.4
Sodium	na	36	na	na	40	60
Specific conductance (µmho/cm)	na	360	na	na	389	562
Sulfate	na	21.4	na	na	21	28.9
Surfactants	na	<0.05	na	na	0.05	0.07
Total alkalinity (as $CaCO_3$)	na	91	na	na	96.6	126
Total dissolved solids (TDS)	na	235	na	na	242	338
Total hardness (as $CaCO_3$)	na	83.7	na	na	91.2	128
Total phosphorus (as PO_4)	na	0.46	na	na	0.37	0.32
Total suspended solids (TSS)	na	2	na	na	4	19.5
Zinc	na	0.039	na	na	0.013	0.024
Nutrients (mg/L)						
Ammonia nitrogen (as N)	na	0.03	na	na	0.02	0.06
Nitrate (as N)	na	<0.1	na	na	<0.1	0.4
Nitrate (as NO_3)	na	<0.4	na	na	<0.4	1.8
Nitrite (as N)	na	<0.1	na	na	<0.02	0.02
Nitrite (as NO_2)	na	<0.35	na	na	<0.07	0.07
Total Kjeldahl nitrogen	na	0.9	na	na	0.8	1
Orthophosphate	1.2	na	1.4	1.1	na	na
Total phosphorus (as PO_4)	0.49	na	0.46	0.42	na	na

Table 7-7a. Monthly analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (continued).

Parameter	4/29	5/7	5/15	5/22	6/10	7/24
Total metals (mg/L)						
Aluminum	na	2.34	na	na	0.8	1.1
Antimony	na	<0.004	na	na	<0.004	<0.004
Arsenic	na	<0.002	na	na	0.0033	0.0044
Barium	na	0.095	na	na	0.085	0.11
Beryllium	na	<0.0002	na	na	<0.0002	<0.0002
Boron	na	0.99	na	na	1	1.2
Cadmium	na	<0.0005	na	na	<0.0005	<0.0005
Chromium	na	0.0091	na	na	0.0027	0.0046
Cobalt	na	<0.05	na	na	<0.05	<0.05
Copper	na	0.0058	na	na	0.007	0.006
Chromium(VI)	na	<0.002	na	na	<0.002	0.02
Iron	na	1.9	na	na	0.82	1.1
Lead	na	<0.005	na	na	<0.005	<0.005
Manganese	na	0.044	na	na	0.09	0.083
Mercury	na	<0.0002	na	na	<0.0002	<0.0002
Molybdenum	na	0.026	na	na	0.028	0.032
Nickel	na	0.0081	na	na	0.0065	0.0066
Selenium	na	<0.005	na	na	<0.002	<0.005
Silver	na	<0.001	na	na	<0.001	<0.001
Thallium	na	<0.001	na	na	<0.001	<0.001
Vanadium	na	<0.01	na	na	<0.01	0.012
Zinc	na	0.028	na	na	<0.02	0.024
Organics						
Chlorophyll-a µg/L)	na	1.55	na	na	4.86	14.1

Table 7-7a. Monthly analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (continued).

Parameter	7/29	8/5	8/12	8/19	8/28	9/3
General minerals (mg/L)						
Aluminum	na	na	na	na	na	0.61
Bicarbonate alkalinity (as $CaCO_3$)	na	na	na	na	na	67.7
Calcium	na	na	na	na	na	38
Carbonate alkalinity (as $CaCO_3$)	na	na	na	na	na	84.2
Chloride	na	na	na	na	na	97
Copper	na	na	na	na	na	<0.01
Fluoride	na	na	na	na	na	0.35
Hydroxide alkalinity (as $CaCO_3$)	na	na	na	na	na	<1
Iron	na	na	na	na	na	0.77
Magnesium	na	na	na	na	na	16
Manganese	na	na	na	na	na	0.086
Nickel	na	na	na	na	na	<0.05
Nitrate (as N)	na	na	na	na	na	<0.1
Nitrate (as NO_3)	na	na	na	na	na	<0.4
Nitrite (as N)	na	na	na	na	na	<0.02
Orthophosphate	na	na	na	na	na	1.4
pH (pH units)	na	na	na	na	na	9.2
Potassium	na	na	na	na	na	3.8
Sodium	na	na	na	na	na	71
Specific conductance (µmho/cm)	na	na	na	na	na	688
Sulfate	na	na	na	na	na	38
Surfactants	na	na	na	na	na	<0.05
Total alkalinity (as $CaCO_3$)	na	na	na	na	na	152
Total dissolved solids (TDS)	na	na	na	na	na	414
Total hardness (as $CaCO_3$)	na	na	na	na	na	161
Total phosphorus (as PO_4)	na	na	na	na	na	0.49
Total suspended solids (TSS)	na	na	na	na	na	15
Zinc	na	na	na	na	na	<0.05
Nutrients (mg/L)						
Ammonia nitrogen (as N)	na	na	na	na	na	0.02
Nitrate (as N)	na	na	na	na	na	<0.1
Nitrate (as NO_3)	na	na	na	na	na	<0.4
Nitrite (as N)	na	na	na	na	na	na
Nitrite (as NO_2)	na	na	na	na	na	na
Total Kjeldahl nitrogen	na	na	na	na	na	0.7
Orthophosphate	0.29	0.62	0.92	1	1.4	na
Total phosphorus (as PO_4)	0.32	0.31	0.4	0.38	0.52	na

Table 7-7a. Monthly analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (continued).

Parameter	7/29	8/5	8/12	8/19	8/28	9/3
Total metals (mg/L)						
Aluminum	na	na	na	na	na	0.85
Antimony	na	na	na	na	na	<0.004
Arsenic	na	na	na	na	na	0.0079
Barium	na	na	na	na	na	0.12
Beryllium	na	na	na	na	na	<0.0002
Boron	na	na	na	na	na	1.5
Cadmium	na	na	na	na	na	<0.0005
Chromium	na	na	na	na	na	0.0031
Cobalt	na	na	na	na	na	<0.05
Copper	na	na	na	na	na	0.0047
Chromium(VI)	na	na	na	na	na	0.003
Iron	na	na	na	na	na	1
Lead	na	na	na	na	na	<0.005
Manganese	na	na	na	na	na	0.086
Mercury	na	na	na	na	na	<0.0002
Molybdenum	na	na	na	na	na	0.032
Nickel	na	na	na	na	na	0.005
Selenium	na	na	na	na	na	<0.004
Silver	na	na	na	na	na	<0.001
Thallium	na	na	na	na	na	<0.001
Vanadium	na	na	na	na	na	0.018
Zinc	na	na	na	na	na	0.023
Organics						
Chlorophyll-a (µg/L)	na	na	na	na	na	13

Table 7-7a. Monthly analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (continued).

Parameter	9/9	9/17	9/24	10/15	10/20	11/6
General minerals (mg/L)						
Aluminum	na	na	na	na	0.7	0.29
Bicarbonate alkalinity (as $CaCO_3$)	na	na	na	na	180	171
Calcium	na	na	na	na	43	51
Carbonate alkalinity (as $CaCO_3$)	na	na	na	na	<1	19
Chloride	na	na	na	na	103	114
Copper	na	na	na	na	<0.01	<0.01
Fluoride	na	na	na	na	0.33	0.36
Hydroxide alkalinity (as $CaCO_3$)	na	na	na	na	<1	<1
Iron	na	na	na	na	0.88	0.4
Magnesium	na	na	na	na	19	22
Manganese	na	na	na	na	0.18	0.065
Nickel	na	na	na	na	<0.05	<0.05
Nitrate (as N)	na	na	na	na	0.29	0.84
Nitrate (as NO_3)	na	na	na	na	1.3	3.7
Nitrite (as N)	na	na	na	na	0.04	0.03
Orthophosphate	na	na	na	na	0.64	0.43
pH (pH units)	na	na	na	na	8.19	8.4
Potassium	na	na	na	na	4.1	4.2
Sodium	na	na	na	na	78	91
Specific conductance (µmho/cm)	na	na	na	na	759	820
Sulfate	na	na	na	na	37.5	44
Surfactants	na	na	na	na	<0.05	<0.05
Total alkalinity (as $CaCO_3$)	na	na	na	na	180	190
Total dissolved solids (TDS)	na	na	na	na	440	463
Total hardness (as $CaCO_3$)	na	na	na	na	190	220
Total phosphorus (as PO_4)	na	na	na	na	0.24	0.21
Total suspended solids (TSS)	na	na	na	na	12	6.7
Zinc	na	na	na	na	0.019	0.022
Nutrients (mg/L)						
Ammonia nitrogen (as N)	na	na	na	na	0.44	0.06
Nitrate (as N)	na	na	na	na	0.29	0.72
Nitrate (as NO_3)	na	na	na	na	1.3	3.2
Nitrite (as N)	na	na	na	na	0.04	0.03
Nitrite (as NO_2)	na	na	na	na	0.13	0.1
Total Kjeldahl nitrogen	na	na	na	na	1.3	0.66
Orthophosphate	1.4	1.2	0.87	na	na	na
Total phosphorus (as PO_4)	0.46	0.52	0.35	na	na	na

Table 7-7a. Monthly analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (continued).

Parameter	9/9	9/17	9/24	10/15	10/20	11/6
Total metals (mg/L)						
Aluminum	na	na	na	1.2	na	0.35
Antimony	na	na	na	<0.004	na	<0.004
Arsenic	na	na	na	0.0054	na	0.0035
Barium	na	na	na	0.154	na	0.14
Beryllium	na	na	na	<0.0002	na	<0.0002
Boron	na	na	na	1.4	na	1.5
Cadmium	na	na	na	<0.0005	na	<0.0005
Chromium	na	na	na	0.0034	na	0.0022
Cobalt	na	na	na	<0.05	na	<0.05
Copper	na	na	na	0.0051	na	0.0026
Chromium(VI)	na	na	na	0.002	na	0.004
Iron	na	na	na	1.6	na	0.45
Lead	na	na	na	<0.005	na	<0.005
Manganese	na	na	na	0.164	na	0.068
Mercury	na	na	na	<0.0002	na	<0.0002
Molybdenum	na	na	na	0.03	na	0.032
Nickel	na	na	na	0.0085	na	0.0041
Selenium	na	na	na	<0.002	na	<0.002
Silver	na	na	na	<0.001	na	<0.001
Thallium	na	na	na	<0.001	na	<0.001
Vanadium	na	na	na	<0.01	na	<0.01
Zinc	na	na	na	<0.02	na	<0.02
Organics						
Chlorophyll-a (µg/L)	na	na	na	na	5.5	6.46

Table 7-7a. Monthly analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (continued).

Parameter	12/2	Minimum	Maximum	Median	Interquartile range	Number of samples
General minerals (mg/L)						
Aluminum	0.9	0.29	4.4	1.2	1.60	11
Bicarbonate alkalinity (as $CaCO_3$)	130	63.4	180	89.4	47.7	11
Calcium	31	14.7	51	22	17.8	11
Carbonate alkalinity (as $CaCO_3$)	<1	<1	84.2	<1	9	11
Chloride	87	25.2	114	38.3	63.4	11
Copper	<0.01	<0.01	<0.01	<0.01	0	11
Fluoride	0.25	0.12	0.36	0.19	0.17	11
Hydroxide alkalinity (as $CaCO_3$)	<1	<1	<1	<1	0	11
Iron	1.1	0.4	4.5	1.2	1.19	11
Magnesium	14	5	22	8.8	8.25	11
Manganese	0.059	0.019	0.18	0.065	0.056	11
Nickel	<0.05	<0.05	<0.05	<0.05	0	11
Nitrate (as N)	0.56	<0.1	0.84	0.4	0.4	11
Nitrate (as NO_3)	2.5	<0.4	3.7	1.8	1.8	11
Nitrite (as N)	0.03	<0.02	0.1	0.035	0.08	10
Orthophosphate	0.46	0.43	1.5	1.2	0.85	11
pH (pH units)	7.94	7.24	9.2	8.19	0.61	11
Potassium	3	3	4.7	4.2	0.9	11
Sodium	65	31	91	40	34	11
Specific conductance (µmho/cm)	622	279	820	389	343	11
Sulfate	41	19.8	44	21.4	16.9	11
Surfactants	<0.05	<0.05	0.09	<0.05	0.02	11
Total alkalinity (as $CaCO_3$)	130	63.4	190	96.6	63.7	11
Total dissolved solids (TDS)	355	200	463	242	168	11
Total hardness (as $CaCO_3$)	140	57.5	220	91.2	80.9	11
Total phosphorus (as PO_4)	0.2	0.2	0.66	0.46	0.33	11
Total suspended solids (TSS)	10	1.7	22.5	8.35	12.18	10
Zinc	0.028	0.013	0.13	0.037	0.030	11
Nutrients (mg/L)						
Ammonia nitrogen (as N)	0.26	0.02	0.44	0.06	0.07	11
Nitrate (as N)	0.56	<0.1	0.72	0.4	0.4	11
Nitrate (as NO_3)	2.5	<0.4	3.2	1.8	1.8	11
Nitrite (as N)	0.03	<0.02	0.1	0.035	0.08	10
Nitrite (as NO_2)	0.1	<0.07	0.35	0.115	0.13	10
Total Kjeldahl nitrogen	0.89	0.66	1.3	0.9	0.4	11
Orthophosphate	na	0.29	2.1	1.3	0.47	19
Total phosphorus (as PO_4)	na	0.31	1.7	0.49	0.13	19

Table 7-7a. Monthly analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (concluded).

Parameter	12/2	Minimum	Maximum	Median	Interquartile range	Number of samples
Total metals (mg/L)						
Aluminum	0.94	0.35	4	1.2	1.5	11
Antimony	<0.004	<0.004	<0.004	<0.004	0	11
Arsenic	0.0036	0.002	0.0079	0.0033	0.0018	11
Barium	0.12	0.078	0.154	0.1	0.037	11
Beryllium	<0.0002	<0.0002	<0.00022	<0.0002	0	11
Boron	1.3	0.74	1.5	1	0.43	11
Cadmium	<0.0005	<0.0005	<0.0005	<0.0005	0	11
Chromium	0.0034	0.0014	0.013	0.0034	0.0038	11
Cobalt	<0.05	<0.05	<0.05	<0.05	0	11
Copper	0.0086	0.0026	0.011	0.006	0.0023	11
Chromium(VI)	<0.002	0.002	0.02	0.002	0.002	11
Iron	1.1	0.45	4.2	1.6	1.04	11
Lead	<0.005	<0.005	<0.005	<0.005	0	11
Manganese	0.061	0.02	0.164	0.066	0.061	11
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	0	11
Molybdenum	<0.025	0.025	0.032	0.026	0.006	11
Nickel	0.0058	0.0041	0.015	0.0081	0.0041	11
Selenium	<0.005	<0.002	<0.005	<0.002	0.003	11
Silver	<0.001	<0.001	<0.001	<0.001	0	11
Thallium	<0.001	<0.001	<0.001	<0.001	0	11
Vanadium	<0.01	<0.01	0.018	<0.01	0	11
Zinc	0.028	<0.02	0.14	0.028	0.02	11
Organics						
Chlorophyll-a (µg/L)	1.3	1.3	15.1	4.60	5.67	12

na = Not analyzed.

Table 7-7b. Quarterly analysis of water samples collected from the Drainage Retention Basin from sample location CDBE.

Parameter	1/27	4/07	7/24	10/15	11/06
Miscellaneous					
Chemical oxygen demand (mg/L)	52.2	32.2	34	27[a]	na[c]
Oil and grease (mg/L)	<1	1.1	<2	<1	na
Fecal coliform (MPN/100 mL)	>1600	<2	<2	na	8[b]
Total coliform (MPN/100 mL)	>1600	30	140	na	30[b]
Herbicides (µg/L)					
(2,4,5-Trichlorophenoxy)acetic acid (2,4,5-T)	<0.05	<0.05	<0.05	<0.05	na
2-(2,4,5-Trichlorophenoxy)propionic acid (Silvex 2,4,5-TP)	<0.05	<0.05	<0.05	<0.05	na
(2,4-Dichlorophenoxy)acetic acid (2,4-D)	<0.2	<0.2	<0.2	0.27	na
4-(2,4-Dichlorophenoxy)butyric acid	<0.5	<0.5	<0.5	<0.5	na
Acenaphthylene	<0.1	<0.1	<0.1	<0.1	<0.1
Alachlor	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	na	na	na	<0.5	<0.5
Aminomethylphosphonic acid	<20	<20	na	na	na
Anthracene	<0.1	<0.1	<0.1	<0.1	<0.1
Atraton	<1	<1	<1	<1	<0.5
Atrazine	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo[*a*]anthracene	<0.3	<0.3	<0.3	<0.3	<0.3
Benzo[*a*]pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[*b*]fluoranthene	<0.3	<0.3	<0.3	<0.3	<0.3
Benzo[*g,h,i*]perylene	<0.3	<0.3	<0.3	<0.3	<0.3
Benzo[*k*]fluoranthene	<0.3	<0.3	<0.3	<0.3	<0.3
BHC, delta isomer	<0.2	<0.2	<0.2	<0.2	<0.2
BHC, gamma isomer (Lindane)	<0.1	<0.1	<0.1	<0.1	<0.1
Bromacil	3.2	3	<1	<1	<0.5
Butachlor	na	na	na	<0.3	<0.38
Butylbenzylphthalate	<1	<1	<1	<1	<1
Chlordane	na	na	na	<2	<2
Chrysene	<0.3	<0.3	<0.3	<0.3	<0.3
Dalapon	<10	<10	<10	<10	na
Di(2-ethylhexyl)adipate	<1	<1	<1	<1	<1
Diazinon	<0.2	<0.2	<0.2	<0.2	<0.2
Dibenzo(a,h)anthracene	<0.3	<0.3	<0.3	<0.3	<0.3
Dibutylphthalate	<1	<1	<1	<1	<1
Dicamba	<0.05	<0.05	<0.05	<0.05	na
Dichloroprop	<0.5	<0.5	<0.5	<0.5	na
Diethylhexylphthalate	3.3	<3	<3	<3	<3

Table 7-7b. Quarterly analysis of water samples collected from the Drainage Retention Basin from sample location CDBE (concluded).

Parameter	1/27	4/07	7/24	10/15	11/06
Herbicides (µg/L) (continued)					
Diethylphthalate	na	na	na	<3	<3
Dimethoate	<1	<1	<1	<1	<2
Dimethylphthalate	<1	<1	<1	<1	<1
Dinoseb	<0.1	<0.1	<0.1	<0.1	na
Diuron	1	<1	<1	33	18
Endrin	na	na	na	<0.2	<0.2
Fluorene	<0.1	<0.1	<0.1	<0.1	<0.1
Glyphosate	<20	<20	<20	<9	na
Heptachlor	na	na	na	<0.1	<0.1
Heptachlor epoxide	na	na	na	<0.1	<0.1
Hexachlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorocyclopentadiene	<1	<1	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	<0.3	<0.3	<0.3	<0.3	<0.3
(4-chloro-2-methylphenoxy)acetic acid (MCPA)	<1	<1	<1	<1	na
2-(4-chloro-2-methylphenoxy)propanoic acid (MCPP)	<1	<1	<1	<1	na
Methoxychlor	<0.5	<0.5	<0.5	<0.5	<0.5
Metolachlor	<1	<1	<1	<1	<0.5
Metribuzin	<1	<1	<1	<1	<0.5
Molinate	<1	<1	<1	<1	<0.5
Pentachlorophenol	na	na	na	<1	<1
Phenanthrene	<0.1	<0.1	<0.1	<0.1	<0.1
Prometon	<1	<1	<1	<1	<0.5
Prometryne	<1	<1	<1	<1	<0.5
Propachlor	na	na	na	<1	<0.5
Pyrene	<0.1	<0.1	<0.1	<0.1	<0.1
Secbumeton	<1	<1	<1	<1	<0.5
Simazine	<0.2	<0.2	<0.2	<0.2	<0.2
Terbutryn	<1	<1	<1	<1	<0.5
Thiobencarb	<1	<1	<1	<1	<0.5
Toxaphene	na	na	na	<5	<5

[a] Sampled 10/20.

[b] Sampled 10/27.

[c] na = Not analyzed.

Table 7-7c. Semiannual analyses of water samples collected from the Drainage Retention Basin at sample location CDBE.

Parameter	4/07	10/15
Miscellaneous organics		
Ethylene dibromide (µg/L)	<0.01	<0.01
Total organic carbon (TOC) (mg/L)	8.6	6.8
Total petroleum hydrocarbons (µg/L)		
Diesel fuel	<50	<40
Gasoline fingerprint	<50	<50
Volatile organic compounds (µg/L)		
1,1,1-Trichloroethane	<0.5	<0.5
1,1,2,2-Tetrachloroethane	<0.5	<0.5
1,1,2-Trichloroethane	<0.5	<0.5
1,1-Dichloroethane	<0.5	<0.5
1,1-Dichloroethene	<0.5	<0.5
1,2-Dichlorobenzene	<0.5	<0.5
1,2-Dichloroethane	<0.5	<0.5
1,2-Dichloroethene (total)	na	<1
1,2-Dichloropropane	<0.5	<0.5
1,3-Dichlorobenzene	<0.5	<0.5
1,4-Dichlorobenzene	<0.5	<0.5
Benzene	<0.5	<0.5
Bromodichloromethane	<0.5	<0.5
Bromoform	<0.5	<0.5
Bromomethane	<0.5	<0.5
Carbon tetrachloride	<0.5	<0.5
Chlorobenzene	<0.5	<0.5
Chloroethane	<0.5	<1
Chloroform	<0.5	<0.5
Chloromethane	<0.5	<1
cis-1,2-Dichloroethene	<0.5	<0.5
cis-1,3-Dichloropropene	<0.5	<0.5
Dibromochloromethane	<0.5	<0.5
Dichlorodifluoromethane	<0.5	<0.5
Ethylbenzene	<0.5	<0.5
Freon 113	<0.5	<0.5
Methylene chloride	<1	<1
Tetrachloroethene	<0.5	<0.5
Toluene	<0.5	<0.5
Total trihalomethanes	<2	<2

Table 7-7c. Semiannual analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (continued).

Parameter	4/07	10/15
Volatile organic compounds (µg/L) (continued)		
Total xylene isomers	<1	<1
trans-1,2-Dichloroethene	<0.5	<0.5
trans-1,3-Dichloropropene	<0.5	<0.5
Trichloroethene	<0.5	<0.5
Trichlorofluoromethane	<0.5	<0.5
Vinyl chloride	<0.5	<0.5
Semivolatile organic compounds (µg/L)		
1,2,4-Trichlorobenzene	<2	<2
1,2-Dichlorobenzene	<2	<2
1,2-Diphenylhydrazine	<2	<2
1,3-Dichlorobenzene	<2	<2
1,4-Dichlorobenzene	<2	<2
2,4,5-Trichlorophenol	<5	<5
2,4,6-Trichlorophenol	<5	<5
2,4-Dichlorophenol	<2	<2
2,4-Dimethylphenol	<2	<2
2,4-Dinitrophenol	<10	<10
2,4-Dinitrotoluene	<2	<2
2,6-Dinitrotoluene	<2	<2
2-Chloronaphthalene	<2	<2
2-Chlorophenol	<2	<2
2-Methyl-4,6-dinitrophenol	<10	<10
2-Methylnaphthalene	<2	<2
2-Naphthylamine	<20	<20
2-Nitroaniline	<2	<2
2-Nitrophenol	<2	<2
3,3-Dichlorobenzidine	<5	<5
3-Nitroaniline	<2	<2
4-Bromophenylphenylether	<2	<2
4-Chloro-3-methylphenol	<5	<5
4-Chloroaniline	<2	<2
4-Chlorophenylphenylether	<2	<2
4-Nitroaniline	<5	<5
4-Nitrophenol	<5	<5
Acenaphthene	<2	<2
Acenaphthylene	<2	<2

Table 7-7c. Semiannual analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (continued).

Parameter	4/07	10/15
Semivolatile organic compounds (µg/L) (continued)		
Aldrin	<2	<2
Aniline	<5	<5
Anthracene	<2	<2
Benzidine	<20	<20
Benzo(a)anthracene	<2	<2
Benzo(a)pyrene	<2	<2
Benzo(b)fluoranthene	<2	<2
Benzo(g,h,i)perylene	<2	<2
Benzo(k)fluoranthene	<2	<2
Benzoic acid	<10	<10
Benzyl alcohol	<2	<2
Hexachlorocyclohenane (BHC), alpha isomer	<2	<2
Hexachlorocyclohenane (BHC), beta isomer	<2	<2
Hexachlorocyclohenane (BHC), delta isomer	<2	<2
Hexachlorocyclohenane (BHC), gamma isomer (Lindane)	<2	<2
Bis(2-chloroethoxy)methane	<2	<2
Bis(2-chloroethyl)ether	<2	<2
Bis(2-chloroisopropyl)ether	<2	<2
Bis(2-ethylhexyl)phthalate	<5	<5
Butylbenzylphthalate	<2	<2
Chrysene	<2	<2
Di-*n*-octylphthalate	<2	<2
Dibenzo(a,h)anthracene	<3	<3
Dibenzofuran	<2	<2
Dibutylphthalate	<2	<2
Dieldrin	<3	<3
Diethylphthalate	<2	<2
Dimethylphthalate	<2	<2
Endosulfan I	<10	<10
Endosulfan II	<10	<10
Endosulfan sulfate	<3	<3
Endrin	<2	<2
Endrin aldehyde	<2	<2
Fluoranthene	<2	<2
Fluorene	<2	<2
Heptachlor	<2	<2
Heptachlor epoxide	<2	<2

Table 7-7c. Semiannual analyses of water samples collected from the Drainage Retention Basin at sample location CDBE (concluded).

Parameter	4/07	10/15
Semivolatile organic compounds (µg/L) (continued)		
Hexachlorobenzene	<2	<2
Hexachlorobutadiene	<2	<2
Hexachlorocyclopentadiene	<2	<2
Hexachloroethane	<2	<2
Indeno(1,2,3-*c,d*)pyrene	<2	<2
Isophorone	<2	<2
N-Nitrosodi-*n*-propylamine	<2	<2
N-Nitrosodimethylamine	<2	<2
N-Nitrosodiphenylamine	<2	<2
Naphthalene	<2	<2
Nitrobenzene	<2	<2
o-Cresol	<2	<2
p,p'-DDD	<2	<2
p,p'-DDE	<3	<3
p,p'-DDT	<2	<2
p-Cresol	<2	<2
Pentachlorophenol	<10	<10
Phenanthrene	<2	<2
Phenol	<2	<2
Pyrene	<2	<2
Radioactivity (Bq/L)		
Gross alpha	<0.061	na
Gross beta	<0.14	na
Tritium	19.9	na

na = Not analyzed.

Table 7-8. Field data collected from the Drainage Retention Basin at eight locations.

Date	Measurement	CDBA	CDBC	CDBD	CDBE	CDBF	CDBJ	CDBK	CDBL
1/17	Dissolved oxygen (mg/L)	10.5	11.8	11.4	11.3	10.7	10.3	10.3	9.9
1/17	Field temperature (°C)	7.7	7.9	7.9	7.8	7.8	7.9	7.8	7.8
1/17	Turbidity (m)	na	na	na	0.28	na	na	na	na
1/24	Dissolved oxygen (mg/L)	10.2	10.5	10.5	10.4	10.2	11	10.7	10.7
1/24	Temperature (°C)	9.5	10.3	10	9.8	9.7	9.7	9.5	9.6
1/24	Turbidity (m)	na	na	na	0.13	na	na	na	na
2/6	Dissolved oxygen (mg/L)	8.5	8.4	8.4	8.3	6	8.1	8.1	5.7
2/6	Temperature (°C)	12.3	15.4	12.9	11.7	11.1	12.8	11.8	11.1
2/6	Turbidity (m)	na	na	na	0.36	na	na	na	na
2/10	Dissolved oxygen (mg/L)	8.5	9	8.3	6.1	5.4	8.6	8	5.4
2/10	Temperature (°C)	12.5	13.6	13	11.4	11.3	12.7	11.8	11.5
2/10	Turbidity (m)	na	na	na	0.33	na	na	na	na
2/21	Dissolved oxygen (mg/L)	8.9	8.8	8.8	8.6	6.8	8.4	8.3	7.4
2/21	Field temperature (°C)	12	12.2	12.1	11.9	11.8	12.1	11.9	11.9
2/28	Dissolved oxygen (mg/L)	9.9	9.3	9.1	9	8.9	8.7	8.5	7.5
2/28	Field temperature (°C)	11.3	11.4	11.4	11.3	11.2	11.6	11.5	11.4
2/28	Turbidity (m)	na	na	na	0.46	na	na	na	na
3/4	Dissolved oxygen (mg/L)	8.9	9.9	9.6	8.9	9.7	8.4	8.4	6.8
3/4	Temperature (°C)	12.2	13.9	13.4	12.5	11.7	12.6	12.1	11.9
3/4	Turbidity (m)	na	na	na	0.46	na	na	na	na
3/17	Dissolved oxygen (mg/L)	8	8.1	8.3	6.9	4.6	8.1	7.3	5.9
3/17	Temperature (°C)	17.7	16.9	16.8	14.4	12.5	17.1	15	12.9
3/17	Turbidity (m)	na	na	na	0.43	na	na	na	na
3/24	Dissolved oxygen (mg/L)	9.2	9.3	7.6	5.4	4.3	7.3	6.2	3.8
3/24	Field temperature (°C)	22.3	21.1	19.9	15.3	12.4	19.3	17.7	12.6
3/24	Turbidity (m)	na	na	na	0.61	na	na	na	na
4/4	Dissolved oxygen (mg/L)	7.9	8.2	8.2	7	6.7	8.6	7.9	6.4
4/4	Temperature (°C)	17.5	20.4	19	14.2	13.9	16.3	15.6	14.7
4/4	Turbidity (m)	na	na	na	0.61	na	na	na	na
4/11	Dissolved oxygen (mg/L)	8.2	11.1	10.5	8.6	4.2	9.9	8.6	4.9
4/11	Temperature (°C)	17.3	19.4	18.6	15.3	13.6	19.7	15.1	13.7
4/11	Turbidity (m)	na	na	na	0.58	na	na	na	na
4/18	Dissolved oxygen (mg/L)	8	11.3	10.2	8.6	4.4	9.6	8.6	4.9
4/18	Temperature (°C)	17	19.5	18	15.3	13.2	19.2	15	13.2
4/18	Turbidity (m)	na	na	na	0.64	na	na	na	na
4/24	Dissolved oxygen (mg/L)	17.2	15.8	12.9	11.9	4.1	13	12.7	3.8
4/24	Temperature (°C)	30.8	28	27.7	26.4	22.7	29.2	28.7	22.9
4/24	Turbidity (m)	na	na	na	0.53	na	na	na	na

Table 7-8. Field data collected from the Drainage Retention Basin at eight locations (continued).

Date	Measurement	CDBA	CDBC	CDBD	CDBE	CDBF	CDBJ	CDBK	CDBL
5/7	Dissolved oxygen (mg/L)	12.7	13.6	12.1	7.5	3.2	11.7	9.3	3.4
5/7	Temperature (°C)	35.7	32.4	30.7	26.7	23.2	33.2	28.2	24.4
5/7	Turbidity (m)	na	na	na	0.61	na	na	na	na
5/22	Dissolved oxygen (mg/L)	18.5	20	19.8	14.9	5	19.6	18.5	4.1
5/22	Field temperature (°C)	20.4	20.2	19.8	19.1	13.4	20	19.5	13.6
5/22	Turbidity (m)	na	na	na	0.79	na	na	na	na
5/29	Dissolved oxygen (mg/L)	5.5	5.7	5.2	4.3	3.2	5.1	4	3.3
5/29	Field temperature (°C)	23.1	22.9	22	20.2	14.4	22.1	18.7	14.1
5/29	Turbidity (m)	na	na	na	1.02	na	na	na	na
6/2	Dissolved oxygen (mg/L)	6.2	5.3	5.8	5.1	4.7	4.9	5.4	4.4
6/2	Field temperature (°C)	26.1	21.9	21.3	21	21	21.5	21.6	21.1
6/2	Turbidity (m)	na	na	na	1.04	na	na	na	na
6/10	Dissolved oxygen (mg/L)	4.2	4.2	3.6	3.4	3.3	3.7	3.8	3.8
6/10	Field temperature (°C)	25.7	22.5	22.4	22.2	22.2	23.9	22.9	22.6
6/10	Turbidity (m)	na	na	na	0.97	na	na	na	na
6/20	Dissolved oxygen (mg/L)	6.8	5.8	5.8	5.5	7	5.8	5.3	4.8
6/20	Field temperature (°C)	22.3	22.6	22.6	22.3	22.3	22.6	22.5	22.3
6/20	Turbidity (m)	na	na	na	1.37	na	na	na	na
6/26	Dissolved oxygen (mg/L)	4.3	4	4.1	3.8	3.9	4.3	3.6	3.4
6/26	Field temperature (°C)	25.9	22.9	23	22.8	22.8	24.9	22.9	22.8
6/26	Turbidity (m)	na	na	na	0.69	na	na	na	na
7/1	Dissolved oxygen (mg/L)	na	na	4.7	na	na	na	na	na
7/1	Field temperature (°C)	na	na	21.5	na	na	na	na	na
7/1	Turbidity (m)	na	na	na	0.43	na	na	na	na
7/11	Dissolved oxygen (mg/L)	9.2	10	11.8	11.6	10.5	11	10	8.5
7/11	Field temperature (°C)	24.8	23.7	23.5	23.3	23.2	24	23.3	23
7/11	Turbidity (m)	na	na	na	0.66	na	na	na	na
7/18	Dissolved oxygen (mg/L)	7.5	6.6	7.3	6.6	4.7	7.2	7.3	4.3
7/18	Field temperature (°C)	23.3	23.2	23	22.3	22.2	23	22.3	22.2
7/18	Turbidity (m)	na	na	na	0.41	na	na	na	na
7/24	Dissolved oxygen (mg/L)	3.5	3.8	4	3.8	3.9	3.6	3.4	3.2
7/24	Field temperature (°C)	28.9	24.3	24.3	23.9	23.7	26.8	23.6	23.8
7/24	Turbidity (m)	na	na	na	0.41	na	na	na	na
7/29	Dissolved oxygen (mg/L)	4.7	4.8	4.7	4.4	4.2	4.3	4.1	4
7/29	Field temperature (°C)	27.7	25.8	24.7	23.5	23.4	25.3	23.8	23.8
8/5	Turbidity (m)	na	na	na	0.71	na	na	na	na
8/12	Dissolved oxygen (mg/L)	8.6	8	8.4	7.2	8.2	8.1	7.9	7.6
8/12	Field temperature (°C)	22	22	21.9	21.7	21.2	22.2	21.3	21

Table 7-8. Field data collected from the Drainage Retention Basin at eight locations (concluded).

Date	Measurement	CDBA	CDBC	CDBD	CDBE	CDBF	CDBJ	CDBK	CDBL
8/22	Dissolved oxygen (mg/L)	11.4	8.6	8.5	8	7.8	9.2	8.6	8.1
8/22	Field temperature (°C)	23.8	23.9	22.5	22	21.8	22.9	22	22
8/28	Dissolved oxygen (mg/L)	9.3	8.8	9	8.3	8	9.5	9.1	8.5
8/28	Field temperature (°C)	24	23.8	23.6	22.7	22.1	22.6	22	22.2
9/3	Dissolved oxygen (mg/L)	8.5	8.1	8.4	7.3	7.9	8	7.7	7.5
9/3	Field temperature (°C)	22	21.7	21.8	21.4	21.4	22	21.8	21.6
9/3	Turbidity (m)	na	na	na	0.51	na	na	na	na
9/9	Dissolved oxygen (mg/L)	10.2	9.8	10	8.7	8.2	9.5	8.8	8.5
9/9	Field temperature (°C)	23.4	23.5	23	22.5	22.3	23.1	22	22
9/17	Dissolved oxygen (mg/L)	11.5	10.7	10.4	9.5	9.3	9.9	10.4	9.1
9/17	Field temperature (°C)	19.8	20.5	20.6	20.6	20.4	20.4	20.5	20.3
9/17	Turbidity (m)	na	na	na	0.61	na	na	na	na
9/24	Dissolved oxygen (mg/L)	6.3	5.3	4.9	4.9	5.1	5.8	5.8	5.1
9/24	Field temperature (°C)	22.6	24	23.7	23.4	20.9	22.5	21.4	20.5
9/24	Turbidity (m)	na	na	na	0.91	na	na	na	na
10/3	Dissolved oxygen (mg/L)	5.2	4.8	4.6	4.3	4.1	4.7	4.1	4
10/3	Field temperature (°C)	24.4	22.8	21.3	20.9	20.4	21.9	20.9	20.8
10/3	Turbidity (m)	na	na	na	0.51	na	na	na	na
10/10	Dissolved oxygen (mg/L)	7.7	6.3	6.3	5.8	5.3	6.6	6.4	5.8
10/10	Field temperature (°C)	17.5	16.3	16.2	16.1	16.1	16.4	16.4	16.4
10/10	Turbidity (m)	na	na	na	0.31	na	na	na	na
10/15	Dissolved oxygen (mg/L)	5.8	6	6.1	5.2	5	5.9	5.5	5.1
10/15	Field temperature (°C)	27.6	26.2	25.2	24.7	23.6	25.8	24.1	23.5
10/15	Turbidity (m)	na	na	na	0.31	na	na	na	na
11/7	Dissolved oxygen (mg/L)	2	5.5	5.6	3.4	3.2	5	5	3.9
11/7	Field temperature (°C)	17.4	16.3	15.9	15.8	15.7	16	16	16
11/7	Turbidity (m)	na	na	na	0.70	na	na	na	na
12/2	Dissolved oxygen (mg/L)	3.9	5.4	5.3	4.8	5.7	4.8	5.4	6.8
12/2	Field temperature (°C)	11	12.1	11.8	10.4	10.4	11	10.7	10.4
12/2	Turbidity (m)	na	na	na	0.46	na	na	na	na
12/11	Dissolved oxygen (mg/L)	3.6	4	3.5	4	4.5	3	3.2	3.2
12/11	Field temperature (°C)	9	9.2	9	8.9	8.9	8.8	8.7	8.6
12/24	Dissolved oxygen (mg/L)	5.1	5.3	3.9	4.1	4.5	4.1	4.9	4.6
12/24	Field temperature (°C)	6.7	6.4	6.4	6.4	6.2	6.5	6.4	6.5
12/31	Dissolved oxygen (mg/L)	7.5	6.7	5.4	5.1	5.6	5.6	5.5	4.8
12/31	Field temperature (°C)	8.6	8.1	6.9	6.3	6.3	7	6.5	6.6

na = Not analyzed.

Table 7-9. Summary of field data collected from the Drainage Retention Basin at eight locations.

	Measurement	CDBA	CDBC	CDBD	CDBE	CDBF	CDBJ	CDBK	CDBL
Minimum	Dissolved oxygen (mg/L)	2	3.8	3.5	3.4	3.2	3	3.2	3.2
	Field temperature (°C)	6.7	6.4	6.4	6.3	6.2	6.5	6.4	6.5
	Turbidity (m)	na	na	na	0.31	na	na	na	na
Maximum	Dissolved oxygen (mg/L)	18.5	20	19.8	14.9	10.7	19.6	18.5	10.7
	Field temperature (°C)	35.7	32.4	30.7	26.7	23.7	33.2	28.7	24.4
	Turbidity (m)	na	na	na	1.37	na	na	na	na
Median	Dissolved oxygen (mg/L)	8	8.1	8.25	6.9	5.1	8.1	7.7	5.1
	Field temperature (°C)	22	21.1	20.95	20.2	16.1	20.4	19.5	16.4
	Turbidity (m)	na	na	na	0.58	na	na	na	na
75th percentile	Dissolved oxygen (mg/L)	9.25	9.85	9.7	8.6	7.85	9.5	8.6	7.45
	Field temperature (°C)	24.2	23.35	23	22.4	22.2	22.95	22.15	22.2
	Turbidity (m)	na	na	na	0.68	na	na	na	na
25th percentile	Dissolved oxygen (mg/L)	5.65	5.45	5.275	4.85	4.25	5.05	5.35	4
	Field temperature (°C)	12.4	14.65	13.3	12.2	11.75	12.75	12	11.9
	Turbidity (m)	na	na	na	0.43	na	na	na	na
Interquartile range	Dissolved oxygen (mg/L)	3.60	4.4	4.425	3.75	3.6	4.45	3.25	3.45
	Field temperature (°C)	11.8	8.7	9.7	10.2	10.45	10.2	10.15	10.3
	Turbidity (m)	na	na	na	0.25	na	na	na	na
Number of samples	Dissolved oxygen (mg/L)	39	39	40	39	39	39	39	39
	Field temperature (°C)	39	39	40	31	39	39	39	39
	Turbidity (m)	na	na	na	na	na	na	na	na

na = Not analyzed.

Table 7-10. Radioactivity in surface and drinking waters (Bq/L), Livermore Valley, 1997.

Location	Date	Tritium	Gross alpha	Gross beta
Drinking waters				
BELL	1/8	<2.43 ± 2.43	—[a]	—[a]
	3/13	<1.18 ± 1.18	<0.0592 ± 0.0252	0.0162 ± 0.126
	7/17	<1.12 ± 1.12	0.0100 ± 0.0229	0.0514 ± 0.144
GAS	1/8	<2.41 ± 2.41	—[a]	—[a]
	3/13	<1.27 ± 1.27	0.0332 ± 0.0444	0.1890 ± 0.137
	7/16	<1.10 ± 1.10	0.0507 ± 0.0370	0.1203 ± 0.152
PALM	1/8	<2.45 ± 2.45	—[a]	—[a]
	3/13	<1.38 ± 1.38	<0.0740 ± 0.0363	0.1170 ± 0.130
	7/17	<1.14 ± 1.14	0.0866 ± 0.0481	0.0932 ± 0.152
ORCH	1/8	<2.43 ± 2.43	—[a]	—[a]
	3/13	<1.31 ± 1.31	0.0263 ± 0.0555	0.3280 ± 0.152
	7/16	<1.12 ± 1.12	0.0389 ± 0.0407	0.4000 ± 0.167
TAP	1/8	<2.43 ± 2.43	—[a]	—[a]
	3/13	<1.33 ± 1.33	<0.0555 ± 0.0222	0.2290 ± 0.141
	7/17	<1.12 ± 1.12	0.0699 ± 0.0337	0.0585 ± 0.141
Surface waters				
CAL	1/8	<2.36 ± 2.36	—[a]	—[a]
	3/13	<1.31 ± 1.31	<0.0629 ± 0.0289	0.0466 ± 0.126
	7/17	<1.09 ± 1.09	0.0710 ± 0.0370	0.0725 ± 0.144
DEL	1/8	<2.41 ± 2.41	—[a]	—[a]
	3/13	<1.27 ± 1.27	0.0068 ± 0.0407	0.145 ± 0.130
	7/16	<1.17 ± 1.17	0.0100 ± 0.0233	0.155 ± 0.152
DUCK	1/9	<2.48 ± 2.48	—[a]	—[a]
	3/13	<1.32 ± 1.32	0.0158 ± 0.1036	0.211 ± 0.152
	7/16	<1.15 ± 1.15	0.0318 ± 0.0292	0.345 ± 0.152
ALAG	1/8	<2.35 ± 2.35	—[a]	—[a]
	3/13	<1.38 ± 1.38	0.1110 ± 0.0740	0.133 ± 0.141
	7/17	<1.18 ± 1.18	0.2938 ± 0.1147	0.144 ± 0.155
SHAD	1/8	<2.50 ± 2.50	—[a]	—[a]
	3/13	<1.34 ± 1.34	0.1258 ± 0.0740	0.145 ± 0.133
	7/17	<1.14 ± 1.14	0.0522 ± 0.0359	0.144 ± 0.155
ZON7	1/9	<2.39 ± 2.39	—[a]	—[a]
	3/13	<1.29 ± 1.29	0.0492 ± 0.0444	0.1180 ± 0.130
	7/16	<1.11 ± 1.11	0.0403 ± 0.0307	0.194 ± 0.152
On-site pool				
POOL	1/9	3.20 ± 2.53	—[b]	—[b]
	2/19	4.14 ± 1.60	—[b]	—[b]
	3/13	7.07 ± 1.46	0.0025 ± 0.0370	0.2653 ± 0.148
	4/17	13.6 ± 1.69	—[b]	—[b]
	5/13	<1.14 ± 1.14	—[b]	—[b]
	7/17	9.03 ± 1.50	0.0614 ± 0.0518	0.3241 ± 0.163
	10/16	6.48 ± 1.55	—[b]	—[b]

[a] Gross alpha/gross beta analyses not conducted on this date.

[b] Pool tritium samples collected monthly until May, then reduced to quarterly. Pool gross alpha/beta samples collected semiannually.

Table 7-11. Annual mass loading for detected metals and organics in samples collected from DRB sampling location CDBX.

Parameter	Loading (kg)	
	Dissolved	Total
Aluminum	39	326
	33	359
Arsenic	0.24	0.52
Barium	10.3	14.5
Boron	134	153
Cadmium	0.07	nd
Chromium`	0.22	0.93
Chromium(VI)	na	0.24
Copper	0.58	1.6
Iron	30	293
	26	318
Manganese	nd	8.8
Nickel	0.14	1.4
Vanadium	nd	1.2
Zinc	2.9	8.0
	1.5	5.1
Bromacil	na	1.6
Diuron	na	1.6

na = Not analyzed.

nd = Not detected above reporting levels.

8

Ground Water

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Methods

Representative samples of ground water from monitoring wells were obtained by following the written protocols contained in the LLNL Environmental Restoration Project Standard Operating Procedures (Dibley and Depue 1997). The protocols cover sampling techniques and specific information for the analytes that are routinely searched for in ground water. Different sampling techniques were applied to different wells depending on whether they were fitted with submersible pumps, had to be bailed, or contained Barcad devices, where we used pressurized nitrogen gas to extract water samples.

Typically, sampling technologists purged wells of standing water and waited for the wells to recover before they collected water samples. They wore disposable vinyl gloves to prevent accidental contamination during sampling and cleaned pH and depth-to-water probes with deionized water after each use. For quality assurance purposes, they obtained field blank samples and equipment blank samples to test the cleanliness of the sampling methods. They used clean sample containers and, where required, they used ultrapure chemicals (mostly acids) to preserve the samples. Off-site laboratories performed most of the water analyses under contract with LLNL. LLNL personnel primarily measured tritium activity on site in a laboratory dedicated to that purpose.

The ground water radioactivity data include some small negative values (in Bq/L). They occur when a correction for background radioactivity is subtracted from measurements of ground waters that contain little or no radioactive material.

At Site 300, wastewater samples from the Photographic and Explosives Process areas, influent to the Sewage Evaporation Pond, and a pond were collected in accordance with written protocols outlined in Operations and Regulatory Affairs Division (ORAD), Water Guidance and Monitoring Group (WGMG) procedure EMP-W-S (Rev. 4): *Water Sampling*. The procedure details several sample collection methodologies appropriate for wastewater sampling. The field technologist selected the exact methodology for sampling the process discharge.

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As with ground water sampling, standard sample handling and hygiene procedures were employed to prevent cross-contamination (e.g., wearing disposable gloves, decontaminating equipment between use, and maintaining samples at 4 ± 2 Celsius). Replicates, field blanks, and trip blanks were collected for quality assurance / quality control purposes. Most analyses were performed off site by contract analytical laboratories except when the on-site laboratory offered better capabilities and / or detection limits.

Technologists sampled wastewater samples from the Chemistry Area and sampled retention tanks associated with buildings 825, 826, and 827 using Hazardous Waste Management Procedure 411. Wastewater was held in retention tanks until analytical results were reviewed for compliance with Waste Discharge Requirements No. 96-248. Most of the analyses were performed by the on-site analytical laboratory; however, some analyses shifted to off-site contract laboratories late in the year.

Livermore Site

Tables 8-1 to **8-3** list analytical methods and reporting limits for inorganic and organic compounds and radioisotopes in ground water. **Tables 8-4** through **8-28** contain analytical data obtained from 23 monitoring wells on and near the LLNL Livermore site.

Table 8-13 shows nitrate concentrations in selected wells on the Livermore site, while tritium activities in 21 ground water monitoring wells in the Livermore Valley are listed in **Table 8-14**. Concentrations of organic compounds, total metals, and soluble metals in Livermore site sediments, July 29–31, are in **Tables 8-82** through **8-84**, respectively.

Site 300

Data from Site 300 monitoring wells (Pits 6, 2, 8, and 9; Elk Ravine; standby supply; water supply; and off-site) are included in **Tables 8-29** through **8-55**. Data from off-site surveillance wells monitored quarterly are in **Tables 8-56** through **8-61**; data for those monitored annually are in **Table 8-62**.

Tables 8-63 and **8-64** contain Pit 1 data pertaining to WDR 93-100 and RCRA Post-Closure Monitoring Plan COCs and statistical limits. **Tables 8-65** and **8-66** have similar data for Pit 7 monitoring wells.

Table 8-67 contains data pertaining to Explosives Process Area wastewater. **Tables 8-68** through **8-71** show quarterly analyses for WDR 96-248 constituents of concern in water beneath Site 300 surface impoundments. **Tables 8-72** through **8-75** show analytical results for constituents not listed in WDR 96-248.

Tables 8-76 to **8-79** contain data obtained from effluent monitoring of photographic and chemical process wastewater. Ground water data for constituents listed under WDR 96-248 are contained in **Tables 8-80** to **8-81**.

Table 8-1. Analytical methods and reporting limits for inorganic constituents of concern in ground water.[(a)]

Constituent of concern	Analytical method	Reporting limit
Metals and minerals (mg/L)		
All alkalinities	EPA 310.1	1
Aluminum	EPA 200.7	0.02
Ammonia nitrogen (as N)	EPA 350.3	0.03
Antimony	EPA 204.2	0.005
Arsenic	EPA 206.2	0.002
Barium	EPA 200.7	0.025
Beryllium	EPA 210.2	0.0005
Cadmium	EPA 213.2	0.0005
Calcium	EPA 200.7	0.5
Chloride	EPA 325.3	1
Chromium	EPA 218.2	0.001
Cobalt	EPA 200.7	0.025
Copper	EPA 200.7	0.01
Fluoride	EPA 340.2	0.1
Hardness, total (as $CaCO_3$)	SM 2320B	1
Iron	EPA 200.7	0.1
Lead	EPA 239.2	0.002
Magnesium	EPA 200.7	0.5
Manganese	EPA 200.7	0.03
Mercury	EPA 245.2	0.0002
Molybdenum	EPA 200.7	0.025
Nickel	EPA 249.2	0.005
Nitrate (as NO_3)	EPA 353.2	0.1
Potassium	EPA 200.7	1
Selenium	EPA 270.2	0.002
Silver	EPA 272.2	0.0005
Sodium	EPA 200.7	1
Sulfate	EPA 300.0	1
Surfactants	EPA 425.1	0.5
Thallium	EPA 279.2	0.001
Total dissolved solids	EPA 160.1	1
Total Kjeldahl nitrogen	EPA 351.4	0.2
Total suspended solids	EPA 160.2	1

Table 8-1. Analytical methods and reporting limits for inorganic constituents of concern in ground water[(a)] (concluded).

Constituent of concern	Analytical method	Reporting limit
Metals and minerals (mg/L) (continued)		
Vanadium	EPA 200.7	0.025
Zinc	EPA 200.7	0.02
Phenolics (mg/L)		
Phenolics	EPA 420.1	0.005
General indicator parameters		
pH (pH units)	EPA 150.1	none
Specific conductance (µmho/cm)	EPA 120.1	1
Total organic carbon (mg/L)	EPA 415.1	0.5
Total organic halides (mg/L)	EPA 9020	0.01
Explosive compounds (µg/L)		
HMX[(b)]	HPLC	5
RDX[(c)]	HPLC	5
TNT[(d)]	HPLC	5
Radioactivity (Bq/L)		
Gross alpha	EPA 900	0.1
Gross beta	EPA 900	0.1
Radioisotopes (Bq/L)		
Plutonium-238 (mBq/L)	U-NAS-NS-3050	0.7– 3.7
Plutonium-239/240 (mBq/L)	U-NAS-NS-3050	0.7 –3.7
Radon-222	EPA 913	0.4
Radium-226	EPA 903	0.1
Radium-228	EPA 904	0.1
Strontium-90	SM 7500	0.1–0.15
Thorium-228	U-NAS-NS-3050	0.1
Thorium-232	U-NAS-NS-3050	0.1
Tritium	LLNL-RAS-011	2
Uranium-234	U-NAS-NS-3050	0.1
Uranium-235	U-NAS-NS-3050	0.1
Uranium-238	U-NAS-NS-3050	0.1

a The significant figures displayed in this table vary by constituent of concern. These variations reflect regulatory agency permit stipulations, or the applicable analytical laboratory contract under which the work was performed, or both.

b HMX is octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

c RDX is hexahydro-1,3,5-trinitro-1,3,5-triazine.

d TNT is 2,4,6-trinitrotoluene.

Table 8-2. Analytical methods and reporting limits for organic constituents of concern in ground water.[(a)]

Constituent of concern	Reporting limit (µg/L)
EPA Method 502.2	
1,1,1,2-Tetrachloroethane	0.2
1,1,1-Trichloroethane	0.2
1,1,2,2-Tetrachloroethane	0.2
1,1,2-Trichloroethane	0.2
1,1-Dichloroethane	0.2
1,1-Dichloroethene	0.2
1,1-Dichloropropene	0.2
1,2,3-Trichlorobenzene	0.2
1,2,3-Trichloropropane	0.2
1,2,4-Trichlorobenzene	0.2
1,2,4-Trimethylbenzene	0.2
1,2-Dichlorobenzene	0.2
1,2-Dichloroethane	0.2
1,2-Dichloropropane	0.2
1,3,5-Trimethylbenzene	0.2
1,3-Dichlorobenzene	0.2
1,3-Dichloropropane	0.2
1,4-Dichlorobenzene	0.2
2,2-Dichloropropane	0.2
2-Chlorotoluene	0.2
4-Chlorotoluene	0.2
Benzene	0.2
Bromobenzene	0.2
Bromochloromethane	0.2
Bromodichloromethane	0.2
Bromoform	0.2
Bromomethane	0.2
Carbon tetrachloride	0.2
Chlorobenzene	0.2
Chloroethane	0.2

Constituent of concern	Reporting limit (µg/L)
Chloroform	0.2
Chloromethane	0.2
cis-1,2-Dichloroethene	0.2
cis-1,3-Dichloropropene	0.5
Dibromochloromethane	0.2
Dibromomethane	0.2
Dichlorodifluoromethane	0.2
Ethylbenzene	0.2
Freon 113	0.2
Hexachlorobutadiene	0.2
Isopropylbenzene	0.2
m- and *p*-Xylene isomers	0.2
Methylene chloride	0.2
n-Butylbenzene	0.2
n-Propylbenzene	0.2
Naphthalene	0.2
o-Xylene	0.2
Isopropyl toluene	0.2
sec-Butylbenzene	0.2
Styrene	0.2
tert-Butylbenzene	0.2
Tetrachloroethene	0.2
Toluene	0.2
trans-1,2-Dichloroethene	0.2
trans-1,3-Dichloropropene	0.2
Trichloroethene	0.2
Trichlorofluoromethane	0.2
Vinyl chloride	0.2
Nitrogen-based herbicides	
Atrazine	1
Bromacil	2

Table 8-2. Analytical methods and reporting limits for organic constituents of concern in ground water[(a)] (continued).

Constituent of concern	Reporting limit (μg/L)
Nitrogen-based herbicides (cont'd)	
Butachlor	1
Diazinon	2
Dimethoate	2
Metolachlor	1
Metribuzin	0.5
Molinate	2
Prometryne	2
Propachlor	1
Simazine	2
Thiobencarb	1
EPA Method 524.2	
1,1,1,2-Tetrachloroethane	1
1,1,1-Trichloroethane	1
1,1,2,2-Tetrachloroethane	1
1,1,2-Trichloroethane	1
1,1-Dichloroethane	1
1,1-Dichloroethene	1
1,1-Dichloropropene	1
1,2,3-Trichlorobenzene	1
1,2,3-Trichloropropane	1
1,2,4-Trichlorobenzene	1
1,2,4-Trimethylbenzene	1
1,2-Dibromo-3-chloropropane	2
1,2-Dichlorobenzene	1
1,2-Dichloroethane	1
1,2-Dichloropropane	1
1,3,5-Trimethylbenzene	1
1,3-Dichlorobenzene	1
1,3-Dichloropropane	1
1,4-Dichlorobenzene	1

Constituent of concern	Reporting limit (μg/L)
2-Chlorotoluene	1
4-Chlorotoluene	1
Benzene	1
Bromobenzene	1
Bromodichloromethane	1
Bromoform	1
Bromomethane	2
Carbon tetrachloride	1
Chlorobenzene	1
Chloroethane	2
Chloroform	1
Chloromethane	2
cis-1,2-Dichloroethene	1
cis-1,3-Dichloropropene	1
Dibromochloromethane	1
Dibromomethane	1
Dichlorodifluoromethane	2
Ethylbenzene	1
Ethylene dibromide	1
Freon 113	1
Hexachlorobutadiene	1
Isopropylbenzene	1
m- and *p*-Xylene isomers	1
Methylene chloride	1
n-Butylbenzene	1
n-Propylbenzene	1
Naphthalene	1
o-Xylene	1
Isopropyl toluene	1
sec-Butylbenzene	1
Styrene	1

Table 8-2. Analytical methods and reporting limits for organic constituents of concern in ground water[a] (continued).

Constituent of concern	Reporting limit (µg/L)
EPA Method 524.2 (cont'd)	
tert-Butylbenzene	1
Tetrachloroethene	1
Toluene	1
trans-1,2-Dichloroethene	1
trans-1,3-Dichloropropene	1
Trichloroethene	0.5
Trichlorofluoromethane	1
Vinyl chloride	2
Glyphosate	20
EPA Method 601	
1,1,1-Trichloroethane	0.5
1,1,2,2-Tetrachloroethane	0.5
1,1,2-Trichloroethane	0.5
1,1-Dichloroethane	0.5
1,1-Dichloroethene	0.5
1,2-Dichlorobenzene	0.5
1,2-Dichloroethane	0.5
1,2-Dichloroethene (total)	0.5
1,2-Dichloropropane	0.5
1,3-Dichlorobenzene	0.5
1,4-Dichlorobenzene	0.5
2-Chloroethylvinylether	0.5
Bromodichloromethane	0.5
Bromoform	0.5
Bromomethane	0.5
Carbon tetrachloride	0.5
Chlorobenzene	0.5
Chloroethane	0.5
Chloroform	0.5
Chloromethane	0.5

Constituent of concern	Reporting limit (µg/L)
cis-1,3-Dichloropropene	0.5
Dibromochloromethane	0.5
Dichlorodifluoromethane	0.5
Freon 113	0.5
Methylene chloride	0.5
Tetrachloroethene	0.5
trans-1,3-Dichloropropene	0.5
Trichloroethene	0.5
Trichlorofluoromethane	0.5
Vinyl chloride	0.5
1,2-Dichlorobenzene	0.5
EPA Method 602	
1,3-Dichlorobenzene	0.3
1,4-Dichlorobenzene	0.3
Benzene	0.4
Chlorobenzene	0.3
Ethylbenzene	0.3
m- and *p*-Xylene isomers	0.4
o-Xylene	0.4
Toluene	0.3
Total xylene isomers	0.4
EPA Method 608	
Aldrin	0.05
BHC, alpha isomer	0.05
BHC, beta isomer	0.05
BHC, delta isomer	0.05
BHC, gamma isomer (Lindane)	0.05
Chlordane	0.5
Dieldrin	0.1
Endosulfan I	0.05
Endosulfan II	0.1

Table 8-2. Analytical methods and reporting limits for organic constituents of concern in ground water[a] (continued).

Constituent of concern	Reporting limit (µg/L)
EPA Method 608 (cont'd)	
Endosulfan sulfate	0.1
Endrin	0.1
Endrin aldehyde	0.1
Heptachlor	0.05
Heptachlor epoxide	0.05
Methoxychlor	0.5
4,4'-DDD	0.1
4,4'-DDE	0.1
4,4'-DDT	0.1
Toxaphene	1
EPA Method 615	
2,4,5-T	0.5
2,4,5-TP (Silvex)	0.2
2,4-D	1
2,4-Dichlorophenoxy acetic acid	2
Dalapon	2
Dicamba	1
Dichloroprop	2
Dinoseb	1
MCPA	250
MCPP	250
EPA Method 624	
1,1,1-Trichloroethane	1
1,1,2,2-Tetrachloroethane	1
1,1,2-Trichloroethane	1
1,1-Dichloroethane	1
1,1-Dichloroethene	1
1,2-Dichlorobenzene	1
1,2-Dichloroethane	1
1,2-Dichloroethene (total)	1

Constituent of concern	Reporting limit (µg/L)
1,2-Dichloropropane	1
1,3-Dichlorobenzene	1
1,4-Dichlorobenzene	1
2-Butanone	10
2-Chloroethylvinylether	10
2-Hexanone	10
4-Methyl-2-pentanone	10
Acetone	10
Benzene	1
Bromodichloromethane	1
Bromoform	1
Bromomethane	2
Carbon disulfide	1
Carbon tetrachloride	1
Chlorobenzene	1
Chloroethane	2
Chloroform	1
Chloromethane	2
cis-1,3-Dichloropropene	1
Dibromochloromethane	1
Dibromomethane	1
Dichlorodifluoromethane	2
Ethylbenzene	1
Freon 113	1
Methylene chloride	1
Styrene	1
Tetrachloroethene	1
Toluene	1
Total xylene isomers	2
trans-1,3-Dichloropropene	1
Trichloroethene	0.5

Table 8-2. Analytical methods and reporting limits for organic constituents of concern in ground water(a) (continued).

Constituent of concern	Reporting limit (µg/L)
EPA Method 624 (cont'd)	
Trichlorofluoromethane	1
Vinyl acetate	10
Vinyl chloride	2
EPA Method 625	
1,2,4-Trichlorobenzene	10
1,2-Dichlorobenzene	10
1,3-Dichlorobenzene	10
1,4-Dichlorobenzene	10
2,4,5-Trichlorophenol	10
2,4,6-Trichlorophenol	10
2,4-Dichlorophenol	10
2,4-Dimethylphenol	10
2,4-Dinitrophenol	50
2,4-Dinitrotoluene	10
2,6-Dinitrotoluene	10
2-Chloronaphthalene	10
2-Chlorophenol	10
2-Methylphenol	10
2-Methyl-4,6-dinitrophenol	50
2-Methylnaphthalene	10
2-Nitroaniline	50
2-Nitrophenol	10
3,3'-Dichlorobenzidine	20
3-Nitroaniline	50
4-Bromophenylphenylether	10
4-Chloro-3-methylphenol	20
4-Chloroaniline	20
4-Chlorophenylphenylether	10
4-Nitroaniline	50
4-Nitrophenol	50
Acenaphthene	10
Acenaphthylene	10
Anthracene	10
Benzo[*a*]anthracene	10
Benzo[*a*]pyrene	10
Benzo[*b*]fluoranthene	10
Benzo[*g,h,i*]perylene	10
Benzo[*k*]fluoranthene	10
Benzoic acid	50
Benzyl alcohol	20
Bis(2-chloroethoxy)methane	10
Bis(2-chloroisopropyl)ether	10
Bis(2-ethylhexyl)phthalate	10
Butylbenzylphthalate	10
Chrysene	10
Di-*n*-butylphthalate	10
Di-*n*-octylphthalate	10
Dibenzo[*a,h*]anthracene	10
Dibenzofuran	10
Diethylphthalate	10
Dimethylphthalate	10
Fluoranthene	10
Fluorene	10
Hexachlorobenzene	10
Hexachlorobutadiene	10
Hexachlorocyclopentadiene	10
Hexachloroethane	10
Indeno[*1,2,3-c,d*]pyrene	10
Isophorone	10

Table 8-2. Analytical methods and reporting limits for organic constituents of concern in ground water[(a)] (concluded).

Constituent of concern	Reporting limit (μg/L)
EPA Method 625 (cont'd)	
m- and *p*-Cresol	10
N-Nitroso-di-*n*-propylamine	10
N-Nitrosodiphenylamine	10
Naphthalene	10
Nitrobenzene	10
Pentachlorophenol	50
Phenanthrene	10
Phenol	10
Pyrene	10
Diuron	0.1

a The significant figures displayed in this table vary by constituent of concern. These variations reflect regulatory agency permit stipulations, or the applicable analytical laboratory contract under which the work was performed, or both.

Table 8-3. Radioisotopes and reporting limits for gamma spectroscopic analysis of constituents of concern in ground water.[(a)]

Constituent of concern	Reporting limit (Bq/L)
Actinium-228	0.52
Americum-241	0.28
Beryllium-7	1.0
Bismuth-214	0.3–0.56
Cobalt-57	1.0
Cobalt-60	0.9
Cesium-137	0.09–0.56
Europium-152	0.56
Potassium-40	1.66
Lead-212	0.26–0.56
Lead-214	0.28–0.56
Promethium-147	2850–4440
Thorium-234	6.3
Thallium-208	0.14
Uranium-235	0.89
Zirconium-95	1.0

a The significant figures displayed in this table vary by constituent of concern. These variations reflect the applicable analytical laboratory contract under which the work was performed.

Table 8-4. Livermore site upgradient Well W-008.

	1st Quarter[a]	2nd Quarter[b]	3rd Quarter[c]	4th Quarter[d]
General indicator parameters				
pH (pH units)	7.88	7.62	7.67	7.63
Specific conductance (μmho/cm)	2590	2510	2560	2540
Total dissolved solids (TDS) (mg/L)	1560	1620	1550	1590
Water temperature (°C)	19.6	17.8	20.5	15.4
Metals and minerals (mg/L)				
Bicarbonate alkalinity (as $CaCO_3$)	231	234	229	240
Carbonate alkalinity (as $CaCO_3$)	<1	<1	<1	<1
Hydroxide alkalinity (as $CaCO_3$)	<1	<1	<1	<1
Total alkalinity (as $CaCO_3$)	231	234	229	240
Aluminum	<0.05	<0.05	<0.05	<0.05
	<0.05	<0.05	<0.05	<0.05
Antimony	<0.004	<0.004	<0.004	<0.004
Arsenic	0.0023	<0.002	0.0022	<0.002
Barium	<0.025	<0.025	<0.025	<0.025
Beryllium	<0.0002	<0.0002	<0.0002	<0.0002
Boron	8.6	9.2	8.5	8.1
Bromide	1.4	1.6	1.4	1.7
Cadmium	<0.0005	<0.0005	<0.0005	<0.0005
Calcium	100	102	99	98
Chloride	494	486	488	486
	498	496	476	484
Chromium	0.0068	0.0060	0.0063	0.0064
Cobalt	<0.05	<0.05	<0.05	<0.05
Copper	<0.01	<0.01	<0.01	0.034
	0.0021	0.0013	0.0015	<0.01
Cyanide	<0.02	<0.02	<0.02	<0.02
Fluoride	1.2	1.2	1.4	1.3
	1.2	1.2	1.4	1.4
Total hardness (as $CaCO_3$)	464	465	461	450
Chromium(VI)	0.009	0.009	0.01	0.009
			0.01	
Iron	0.15	<0.05	<0.05	0.097
	<0.05	<0.05	<0.05	<0.05
Lead	<0.005	<0.005	<0.005	<0.005
Magnesium	52	51	52	51
Manganese	<0.01	<0.01	<0.01	<0.01
	<0.01	<0.01	<0.01	<0.01

Table 8-4. Livermore site upgradient Well W-008 (continued).

	1st Quarter[a]	2nd Quarter[b]	3rd Quarter[c]	4th Quarter[d]
Metals and minerals (mg/L) (cont'd)				
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	<0.025	<0.025	<0.025	<0.025
Nickel	<0.05	<0.05	<0.05	<0.05
	<0.002	<0.002	<0.002	<0.002
Nitrate (as NO_3)	17.7	18.6	19.0	19.5
	16.8	18.6	19.0	19.0
Nitrite (as NO_2)	<0.2	<0.07	<0.07	<0.07
Orthophosphate	0.08	0.07	0.08	0.06
	0.08	0.05	0.07	0.07
Total phosphorus (as PO_4)	<0.05	<0.05	<0.05	<0.05
Potassium	2.1	2.0	2.0	1.9
Selenium	<0.002	<0.005	<0.005	<0.005
Silver	<0.001	<0.001	<0.001	<0.001
Sodium	363	366	352	374
Sulfate	328	312	313	324
	332	316	304	324
Surfactants	<0.05	<0.05	<0.05	<0.05
Thallium	<0.001	<0.001	<0.001	<0.001
Vanadium	0.019	0.015	0.017	0.013
Zinc	0.015	0.012	<0.01	0.021
	<0.02	<0.02	<0.02	<0.02
Semivolatile organic compounds (µg/L)[e]				
Di-*n*-octylphthalate	12	<2	<2	<2
Nitrogen-based herbicides (µg/L)[e]				
Butylbenzylphthalate	na[f]	na	1.2	na
Glyphosate (Roundup) (µg/L)	<20	<20	<5	<9
Diuron (µg/L)	<0.1	<0.1	<1	<1
Other parameters				
Field pH (pH units)	7.21	7.44	7.44	7.25
Field specific conductance (µmho/cm)		2500	2600	2300
Nitrite (as N)	<0.1	<0.02	<0.02	<0.02
	<0.02	<0.02	<0.02	<0.02
Nitrate (as N)	4.0	4.2	4.3	4.4
	3.8	4.2	4.3	4.4
Radioactivity (Bq/L)				
Gross alpha	0.2	0.3	0.3	0.38
Gross beta	0.3	0.1	0.1	0.14

Table 8-4. Livermore site upgradient Well W-008 (concluded).

	1st Quarter[a]	2nd Quarter[b]	3rd Quarter[c]	4th Quarter[d]
Radioisotopes (Bq/L)				
Radium-226	na	0.003	0.004	<0.0056
Radium-228	na	0.029	–0.033	na
Radon-222	8.88	16.3	18.1	13.8
Tritium	<1.20	<1.40	<1.31	<1.25
Radioisotopes by alpha spectroscopy (mBq/L)				
Plutonium-238	na	na	0.13	na
Plutonium-239/240	na	na	0.7	na
Thorium-228	na	na	0.7	na
Thorium-230	na	na	0.1	na
Thorium-232	na	na	–0.4	
Uranium-234/233 (Bq/L)	0.105	0.117	0.128	0.17
Uranium-235/236 (Bq/L)	0.003	<0.0074	0.009	0.01
Uranium-238 (Bq/L)	0.085	0.07	0.092	0.1
Radioisotopes by gamma spectroscopy (Bq/L)[h]				
Bismuth-214	na[g]	na	1.073	na
Lead-214	na	na	0.777	na

a First quarter samples collected on 3/12/97.

b Second quarter samples collected on 6/12/97.

c Third quarter samples collected on 8/19/97 (for radioisotopes) and 9/25/97 (for others).

d Fourth quarter samples collected on 12/29/97.

e No other compounds in this suite were detected.

f na = Not analyzed.

g nd = Not detected.

h Only bismuth-214 and lead-214 were detected at activities greater than the reporting limit.

Table 8-5. Livermore site upgradient Well W-221.

	1st Quarter[a]	2nd Quarter[b]	3rd Quarter[c]	4th Quarter[d]
General indicator parameters				
pH (pH units)	7.58	8.02	8.21	7.60
Specific conductance (μmho/cm)	1630	1720	1680	1670
Total dissolved solids (TDS) (mg/L)	940	1000	995	995
Water temperature (°C)	20.6	20.5	20.7	20.9
Metals and minerals (mg/L)				
Bicarbonate alkalinity (as $CaCO_3$)	333	336	121	350
Carbonate alkalinity (as $CaCO_3$)	<1	<1	24.2	<1
Hydroxide alkalinity (as $CaCO_3$)	<1	<1	<1	<1
Total alkalinity (as $CaCO_3$)	333	336	146	350
Aluminum	<0.05	<0.05	<0.05	<0.05
Antimony	<0.004	<0.004	<0.004	<0.004
Arsenic	<0.002	<0.002	<0.002	<0.002
Barium	0.12	0.12	0.11	0.10
Beryllium	<0.0002	<0.0002	<0.0002	<0.0002
Boron	2.5	2.6	2.3	2.3
Bromide	0.77	1.0	0.76	0.94
Cadmium	<0.0005	<0.0005	<0.0005	<0.0005
Calcium	130	129	116	120
Chloride	272	290	281	280
	276	286	282	282
Chromium	0.004	0.0053	0.0072	0.004
Cobalt	<0.05	<0.05	<0.05	<0.05
Copper	<0.01	<0.01	<0.01	0.092
	0.0028	0.0020	0.0015	<0.01
Cyanide	<0.02	<0.02	<0.02	<0.02
Fluoride	0.71	0.73	0.79	0.76
	0.71	0.71	0.71	0.80
Total hardness (as $CaCO_3$)	514	503	454	480
Chromium(VI)	0.004	<0.002	0.006	0.002
Iron	0.075	<0.05	<0.05	<0.05
Lead	<0.005	<0.005	<0.005	<0.005
Magnesium	46	44	40	43
Manganese	<0.01	<0.01	<0.01	<0.01

Table 8-5. Livermore site upgradient Well W-221 (continued).

	1st Quarter[a]	2nd Quarter[b]	3rd Quarter[c]	4th Quarter[d]
Metals and minerals (mg/L) (continued)				
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	<0.025	<0.025	<0.025	<0.025
Nickel	<0.002	0.036	0.040	0.013
Nitrate (as NO_3)	22.6	25.7	24.3	27
	17.7	25.7	24.3	27
Nitrite (as NO_2)	<0.07	<0.07	<0.07	<0.07
Orthophosphate	0.06	<0.05	<0.05	<0.05
Total phosphorus (as PO_4)	<0.05	<0.05	<0.05	<0.05
Potassium	2.2	2	1.7	1.7
Selenium	<0.002	<0.005	<0.005	<0.005
Silver	<0.001	<0.001	<0.001	<0.001
Sodium	155	160	113	136
Sulfate	82.8	88.2	89.3	82
	81.6	88.3	89.4	82
Surfactants	<0.05	<0.05	<0.05	<0.05
Thallium	<0.001	<0.001	<0.001	<0.001
Vanadium	0.011	<0.01	0.012	0.011
Zinc	0.038	<0.01	29	0.012
	<0.02	<0.02	<0.02	<0.02
Semivolatile organic compounds (µg/L)	nd[e]	nd	nd	nd
Nitrogen-based herbicides (µg/L)[f]	nd	nd	nd	nd
Glyphosate (Roundup) (µg/L)	<20	<20	<5	<9
Diuron (µg/L)	<0.1	<0.1	<1	<1
Other parameters				
Field pH (pH units)	7.09	7.29	7.34	6.99
			7.14	
Field specific conductance (µmho/cm)	1324	1700	1995	1700
	—	—	1650	—
Nitrite (as N)	<0.02	<0.02	<0.02	<0.02
	<0.1	<0.02	<0.02	<0.02
Nitrate (as N)	5.1	5.8	5.5	6.2
	4	5.8	5.5	6.2
Radioactivity (Bq/L)				
Gross alpha	0.296	0.296	0.222	0.163
Gross beta	0.222	0.185	<0.148	0.148

Table 8-5. Livermore site upgradient Well W-221 (concluded).

	1st Quarter[(a)]	2nd Quarter[(b)]	3rd Quarter[(c)]	4th Quarter[(d)]
Radioisotopes (Bq/L)				
Radium-226	na[(g)]	–0.003	0.04	0.004
Radium-228	na	0.04	0.006	na
Radon-222	5.55	3.70	12.58	9.77
Tritium	1.45	2.77	2.45	<1.302
Radioisotopes by alpha spectroscopy (mBq/L)				
Plutonium-238	na	na	<0.37	na
Plutonium-239/240	na	na	1.	na
Thorium-228	na	na	1.	na
Thorium-230	na	na	0.1	na
Thorium-232	na	na	0.1	na
Uranium-234/233 (Bq/L)		0.21	0.21	0.176
Uranium-235/236 (Bq/L)		0.01	0.02	0.008
Uranium 238 (Bq/L)	0.12	0.15	0.16	0.138
Radioisotopes by gamma spectroscopy (Bq/L)[(f)]				

a First quarter samples collected on 3/13/97.
b Second quarter samples collected on 6/12/97.
c Third quarter samples collected on 8/18/97 (for radioisotopes) and 9/29/98 (for others).
d Fourth quarter samples collected on 12/29/97.
e nd = Not detected.
f No analytes were detected with activities above the reporting limit.
g na = Not analyzed.

Table 8-6. Livermore site downgradient Well 14B1 (near TFA).

	1st Quarter[a]	3rd Quarter[b]
General indicator parameters		
pH (pH units)	7.69	7.52
Specific conductance (µmho/cm)	824	816
Total dissolved solids (mg/L)	482	493
Water temperature (°C)	nt[c]	19.8
Metals and minerals (mg/L)		
Bicarbonate alkalinity (as $CaCO_3$)	228	209
Carbonate alkalinity (as $CaCO_3$)	<1	<1
Hydroxide alkalinity (as $CaCO_3$)	<1	<1
Total alkalinity (as $CaCO_3$)	228	209
Aluminum	<0.05	<0.05
	<0.05	<0.05
Antimony	<0.025	<0.004
Arsenic	<0.002	<0.002
Barium	0.105	0.11
Beryllium	<0.0002	<0.0002
Boron	0.73	0.73
Bromide	0.24	0.26
Cadmium	<0.0005	<0.0005
Calcium	54	57
Chloride	78.4	75.5
	78.4	76.3
Chromium	0.01	0.01
Cobalt	<0.05	<0.05
Copper	<0.01	<0.01
	0.0028	<0.001
Cyanide	<0.02	<0.02
Fluoride	0.26	0.24
	0.3	0.24
Total hardness (as $CaCO_3$)	267	270
Chromium(VI)	0.011	0.01
Iron	0.058	<0.05
	<0.05	<0.05
Lead	<0.005	<0.005
Magnesium	32	31
Manganese	<0.01	<0.01
	<0.01	<0.01

Table 8-6. Livermore site downgradient Well 14B1 (near TFA) (continued).

	1st Quarter[a]	3rd Quarter[b]
Metals and minerals (mg/L) (continued)		
Mercury	<0.0002	<0.0002
Molybdenum	<0.025	<0.025
Nickel	<0.05	<0.05
	<0.002	<0.002
Nitrate (as NO_3)	27.9	24.8
Nitrate (as NO_3)	26.6	25.2
Nitrite (as NO_2)	<0.07	<0.07
Orthophosphate	0.26	0.23
	0.26	0.23
Total phosphorus (as $P0_4$)	0.08	0.08
Potassium	2.1	2.1
Selenium	<0.002	<0.005
Silver	<0.001	<0.001
Sodium	67	70
Sulfate	48.2	47.6
	48	48.4
Surfactants	<0.05	<0.05
Thallium	<0.001	<0.001
Vanadium	<0.01	<0.01
Zinc	0.05	0.031
	0.037	0.027
Semivolatile organic compounds (µg/L)[d]	nd[e]	nd
Nitrogen-based herbicides (µg/L)[d]	nd	nd
Glyphosate (Roundup) (µg/L)	<20	<5
Diuron (µg/L)	<0.1	<1
Other parameters		
Field pH (pH units)	nt	7.24
Field specific conductance (µmho/cm)	nt	959
Nitrite (as N)	<0.02	<0.02
	<0.02	<0.02
Nitrate (as N)	6.3	5.6
	6	5.7
Radioactivity (Bq/L)		
Gross alpha	0.07	0.07
Gross beta	0.19	0.04

Table 8-6. Livermore site downgradient Well 14B1 (near TFA) (concluded).

	1st Quarter(a)	3rd Quarter(b)
Radioisotopes (Bq/L)		
Radium-226	na(f)	0(g)
Radium-228	na	0.01
Radon-222	10.7	13.
Tritium	2.26	2.06
Radioisotopes by alpha spectroscopy (mBq/L)		
Plutonium-238	nd	<0.4
Plutonium239/240	nd	0.1
Thorium-228	nd	0.2
Thorium-230	nd	–0.1
Thorium-232	nd	0.4
Uranium-234/233 (Bq/L)	0.04	0.04
Uranium-235/236 (Bq/L)	0.002	0.002
Uranium 238 (Bq/L)	0.02	0.03
Radioisotopes by gamma spectroscopy (Bq/L)(h)		
Zirconium-95	nd	0.09

a First quarter samples collected on 3/11/97.

b Third quarter samples collected on 8/19/97 and 9/15/97.

c nt = Parameters were not measured because this was a grab sample.

d No compounds in this suite were detected.

e nd = Not detected.

f na = Not analyzed.

g Laboratory reported concentration as 0 ±1 pCi/L.

h Only zirconium-95 was detected at an activity above the reporting limit.

Table 8-7. Livermore site downgradient Well W-1012 (near TFB).

	1st Quarter[a]	3rd Quarter[b]
General indicator parameters		
pH (pH units)	8.59	7.53
Specific conductance (μmho/cm)	1120	1070
Total dissolved solids (mg/L)	610	597
Water temperature (°C)	20.2	19.5
		20
Metals and minerals (mg/L)		
Bicarbonate alkalinity (as $CaCO_3$)	219	259
Carbonate alkalinity (as $CaCO_3$)	35.5	<1
Hydroxide alkalinity (as $CaCO_3$)	<1	<1
Total alkalinity (as $CaCO_3$)	254	259
Aluminum	<0.05	<0.05
	<0.05	<0.1
Antimony	<0.004	<0.005
Arsenic	<0.002	<0.002
Barium	0.13	0.13
Beryllium	<0.0002	<0.0005
Boron	0.63	0.67
Bromide	0.55	0.56
Cadmium	<0.0005	<0.0005
Calcium	99	89
Chloride	139	130
	140	129
Chromium	0.019	0.02
Cobalt	<0.05	<0.05
Copper	<0.01	<0.01
	0.001	<0.001
Cyanide	<0.02	<0.02
Fluoride	0.22	0.22
	0.21	0.22
Total hardness (as $CaCO_3$)	395	358
Chromium(VI)	0.014	0.019
Iron	<0.05	<0.05
Iron	<0.05	<0.1
Lead	<0.005	<0.005
Magnesium	36	33
Manganese	<0.01	<0.01
	<0.01	<0.03

Table 8-7. Livermore site downgradient Well W-1012 (near TFB) (continued).

	1st Quarter[a]	3rd Quarter[b]
Metals and minerals (mg/L) (continued)		
Mercury	<0.0002	<0.0002
Molybdenum	<0.025	<0.025
Nickel	<0.05	<0.05
	0.0041	0.003
Nitrate (as NO_3)[c]	88.6	79.7
	93	76.6
Nitrite (as NO_2)	<0.07	<0.07
Orthophosphate	0.15	0.15
	0.16	0.15
Total phosphorus (as PO_4)	0.07	0.06
Potassium	3.1	2.7
Selenium	<0.002	<0.005
Silver	<0.001	<0.001
Sodium	86	73
Sulfate	27	27.1
	27.1	26.9
Surfactants	<0.05	<0.05
Thallium	<0.001	<0.001
Vanadium	<0.01	<0.02
Zinc	0.022	0.018
	<0.02	<0.02
Semivolatile organic compounds (µg/L)[d]	nd[e]	nd
Nitrogen-based herbicides (µg/L)[f]		
Diethylhexylphthalate	nd	21
Glyphosate (Roundup) (µg/L)	<20	<5
Diuron (µg/L)	<0.1	<1
Other parameters		
Field pH (pH units)	7.29	7.21
		7.00
Field specific conductance (µmho/cm)	244[g]	1050
		875
Nitrite (as N)	<0.02	<0.02
	<0.02	<0.02
Nitrate (as N)	20	18
	21	17
Radioactivity (Bq/L)		
Gross alpha	0.185	0.111
Gross beta	<0.21	0.148

Table 8-7. Livermore site downgradient Well W-1012 (near TFB) (concluded).

	1st Quarter[(a)]	3rd Quarter[(b)]
Radioisotopes (Bq/L)		
Radium-226	0.004	0[(h)]
Radium-228	0.01	–0.005
Tritium	<1.21	<1.3
Radioisotopes by alpha spectroscopy (mBq/L)		
Plutonium-238	na[(i)]	0.1
Plutonium-239/240	na	–0.1
Thorium-228	na	0.4
Thorium-230	na	–0.5
Thorium-232	na	–0.04
Uranium-234/233 (Bq/L)	0.07	0.068
Uranium-235/236 (Bq/L)	0.003	0.004
Uranium-238 (Bq/L)	0.04	0.05
Radioisotopes by gamma spectroscopy (Bq/L)[(j)]		
Bismuth-214	na	0.39
Lead-214	na	0.38

a First quarter samples collected on 3/5/97.

b Third quarter samples collected on 8/19/97 and 9/22/97.

c Nitrate (as NO_3) was analyzed at 84.2 mg/L in the second quarter.

d No compounds in this suite were detected.

e nd = Not detected.

f No other compounds in this suite were detected.

g Reading questionable per sampling coordinator.

h Laboratory reported concentration as 0 ±1 pCi/L.

I na = Not analyzed.

j Only bismuth-214 and lead-214 were detected at an activity above the reporting limit.

Table 8-8. Livermore site downgradient Well W-121 (near TFA).

	1st Quarter[(a)]	3rd Quarter[(b)]
General indicator parameters		
pH (pH units)	8.04	8.07
Specific conductance (µmho/cm)	754	749
Total dissolved solids (mg/L)	462	432
Water temperature (°C)	20.3	19.3
		18.4
Metals and minerals (mg/L)		
Bicarbonate alkalinity (as $CaCO_3$)	185	211
Carbonate alkalinity (as $CaCO_3$)	<1	<1
Hydroxide alkalinity (as $CaCO_3$)	<1	<1
Total alkalinity (as $CaCO_3$)	185	211
Aluminum	<0.05	<0.05
	<0.05	<0.05
Antimony	<0.025	<0.004
Arsenic	<0.002	<0.002
Barium	0.067	<0.025
Beryllium	<0.0002	<0.0002
Boron	0.92	0.86
Bromide	0.26	0.32
Cadmium	<0.0005	<0.0005
Calcium	36	40
Chloride	81.1	77.8
	82.8	77.8
Chromium	0.011	0.011
Cobalt	<0.05	<0.05
Copper	<0.01	0.024
	0.0014	0.0015
Cyanide	<0.02	<0.02
Fluoride	0.33	0.34
	0.32	0.28
Total hardness (as $CaCO_3$)	213	227
Chromium(VI)	0.011	0.011
Iron	<0.05	<0.05
	<0.05	<0.05
Lead	<0.005	<0.005
Magnesium	30	31
Manganese	<0.01	<0.01
	<0.01	<0.01

Table 8-8. Livermore site downgradient Well W-121 (near TFA) (continued).

	1st Quarter[a]	3rd Quarter[b]
Metals and minerals (mg/L) (continued)		
Mercury	<0.0002	<0.0002
Molybdenum	<0.025	<0.025
Nickel	<0.05	<0.05
	<0.002	<0.002
Nitrate (as NO_3)	30.1	31.9
	30.1	31.9
Nitrite (as NO_2)	<0.07	<0.07
Orthophosphate	0.25	0.23
	0.24	0.24
Total phosphorus (as PO_4)	0.08	0.09
Potassium	1.9	1.9
Selenium	<0.002	<0.005
Silver	<0.001	<0.001
Sodium	69	72
Sulfate	38.4	37.5
	38.5	37.6
Surfactants	<0.05	<0.05
Thallium	<0.001	<0.001
Vanadium	<0.01	<0.01
Zinc	0.021	<0.01
	<0.02	<0.01
Semivolatile organic compounds (µg/L)[c]	nd[d]	nd
Nitrogen-based herbicides (µg/L[c]	nd	nd
Glyphosate (Roundup) (µg/L)	<20	<5
Diuron (µg/L)	<0.1	<1
Other parameters		
Field pH (pH units)	8.36	7.7
		7.72
Field specific conductance (µmho/cm)	900	870
		900
Nitrite (as N)	<0.02	<0.02
	<0.02	<0.02
Nitrate (as N)	6.8	7.2
	6.8	7.2
Radioactivity (Bq/L)		
Gross alpha	0.03	0.04
Gross beta	0.07	0.04

Table 8-8. Livermore site downgradient Well W-121 (near TFA) (concluded).

	1st Quarter[(a)]	3rd Quarter[(b)]
Radioisotopes (Bq/L)		
Radium-226	na[(e)]	0[(f)]
Radium-228	na	–0.017
Radon-222	14.8	13.7
Tritium	<1.15	<1.32
Radioisotopes by alpha spectroscopy (mBq/L)		
Plutonium-238	na	–0.06
Plutonium-239/240	na	0.1
Thorium-228	na	0.7
Thorium-230	na	–0.3
Thorium-232	na	–0.2
Uranium-234/233 (Bq/L)	0.016	0.021
Uranium-235/236 (Bq/L)	0.0021	0.0017
Uranium-238 (Bq/L)	0.0089	0.013
Radioisotopes by gamma spectroscopy (Bq/L)[(g)]		
Bismuth-214	29.6	0.5
Lead-214	23.3	0.36

a First quarter samples collected on 3/11/97.

b Third quarter samples collected on 8/19/97 (for radioisotopes) and 9/16/97 (for others).

c All compounds in this suite were not detected.

d nd = Not detected.

e na = Not analyzed.

f Laboratory reported concentration as 0 ±1 pCi/L.

g Only bismuth-214 and lead-214 were detected at an activity above the reporting limit.

Table 8-9. Livermore site downgradient Well W-151 (near TFA).

	1st Quarter[a]	3rd Quarter[b]
General indicator parameters		
pH (pH units)	7.81	7.92
Specific conductance (μmho/cm)	868	868
Total dissolved solids (mg/L)	508	490
Water temperature (°C)	19.1	19
		20
Metals and minerals (mg/L)		
Bicarbonate alkalinity (as $CaCO_3$)	244	251
Carbonate alkalinity (as $CaCO_3$)	<1	<1
Hydroxide alkalinity (as $CaCO_3$)	<1	<1
Total alkalinity (as $CaCO_3$)	244	251
Aluminum	<0.05	<0.05
	<0.05	<0.05
Antimony	<0.004	<0.004
Arsenic	<0.002	<0.002
Barium	0.08	<0.025
Beryllium	<0.0002	<0.0002
Boron	0.77	0.74
Bromide	0.24	0.26
Cadmium	<0.0005	<0.0005
Calcium	50	55
Chloride	84.1	82.8
	84.5	82.7
Chromium	0.017	0.017
Cobalt	<0.05	<0.05
Copper	<0.01	<0.01
	0.0019	0.0012
Cyanide	<0.02	<0.02
Fluoride	0.3	0.32
	0.29	0.27
Total hardness (as $CaCO_3$)	281	298
Chromium(VI)	0.017	0.017
Iron	<0.05	<0.05
	<0.05	<0.05
Lead	<0.005	<0.005
Magnesium	38	39
Manganese	<0.01	<0.01
	<0.01	<0.01

Table 8-9. Livermore site downgradient Well W-151 (near TFA) (continued).

	1st Quarter[a]	3rd Quarter[b]
Metals and minerals (mg/L) (continued)		
Mercury	<0.0002	<0.0002
Molybdenum	<0.025	<0.025
Nickel	<0.05	<0.05
	<0.002	<0.002
Nitrate (as NO_3)	33.7	36.8
	35.4	36.7
Nitrite (as NO_2)	<0.07	<0.07
Orthophosphate	0.27	0.25
	0.28	0.26
Total phosphorus (as PO_4)	0.1	0.09
Potassium	2	2
Selenium	<0.002	<0.005
Silver	<0.001	<0.001
Sodium	69	74
Sulfate	41.7	40.7
	41.8	40.8
Surfactants	<0.05	<0.05
Thallium	<0.001	<0.001
Vanadium	<0.01	<0.01
Zinc	<0.01	0.015
	<0.02	<0.01
Semivolatile organic compounds (µg/L)[c]	nd[d]	nd
Nitrogen-based herbicides (µg/L)[c]	nd	nd
Glyphosate (Roundup) (µg/L)	<20	<5
Diuron (µg/L)	<0.1	<1
Other parameters		
Field pH (pH units)	7.55	7.32
		7.52
Field specific conductance (µmho/cm)	651	1011
		465
Nitrite (as N)	<0.02	<0.02
	<0.02	<0.02
Nitrate (as N)	7.6	8.3
	8	8.3
Radioactivity (Bq/L)		
Gross alpha	0.04	0.037
Gross beta	0.1	0.11

Table 8-9. Livermore site downgradient Well W-151 (near TFA) (concluded).

	1st Quarter[(a)]	3rd Quarter[(b)]
Radioisotopes (Bq/L)		
Radium-226	na[(e)]	0[(f)]
Radium-228	na	0.024
Uranium-234/233	0.0307	0.038
Uranium-235/236	0.002	0.0012
Uranium-238	0.02	0.0225
Tritium	<1.2	2.24
Radon-222	8.14	8.9
Radioisotopes by alpha spectroscopy (mBq/L)		
Plutonium-238	na	0.13
Plutonium-239/240	na	–0.27
Thorium-228	na	–0.4
Thorium-230	na	–0.11
Thorium-232	na	0.15
Radioisotopes by gamma spectroscopy (Bq/L)[(g)]		
Bismuth-214	16	0.74
Lead-214	12[(g)]	0.48

a First quarter samples collected on 3/11/97.

b Third quarter samples collected on 8/19/97 (for radioisotopes) and 9/16/97 (for others).

c All compounds in this suite were not detected.

d nd = Not detected.

e na = Not analyzed.

f Laboratory reported concentration as 0 ±1 pCi/L.

g Only bismuth-214 and lead-214 were detected at an activity above the reporting limit

Table 8-10. Livermore site downgradient Well W-373 (near TFC).

	1st Quarter[a]	3rd Quarter[b]
General indicator parameters		
pH (pH units)	8.02	7.73
Specific conductance (μmho/cm)	920	931
Total dissolved solids (mg/L)	533	540
Water temperature (°C)	18.7	18.9
		18.7
Metals and minerals (mg/L)		
Bicarbonate alkalinity (as $CaCO_3$)	246	203
Carbonate alkalinity (as $CaCO_3$)	<1	<1
Hydroxide alkalinity (as $CaCO_3$)	<1	<1
Total alkalinity (as $CaCO_3$)	202	203
Aluminum	<0.05	<0.05
	<0.05	<0.1
Antimony	<0.004	<0.005
Arsenic	<0.002	<0.002
Barium	0.05	0.049
Beryllium	<0.0002	<0.0005
Boron	1.8	1.7
Bromide	0.36	0.36
Cadmium	<0.0005	<0.0005
Calcium	51	52
Chloride	119	120
	118	120
Chromium	0.074	0.08
Cobalt	<0.05	<0.05
Copper	<0.01	<0.01
	0.0012	<0.001
Cyanide	<0.02	<0.02
Fluoride	0.52	0.57
	0.51	0.55
Total hardness (as $CaCO_3$)	207	208
Chromium(VI)	0.078	0.083
Iron	<0.05	<0.05
	<0.05	<0.1
Lead	<0.005	<0.005
Magnesium	19.4	19
Manganese	<0.01	<0.01
	<0.01	<0.03

Table 8-10. Livermore site downgradient Well W-373 (near TFC) (continued).

	1st Quarter[a]	3rd Quarter[b]
Metals and minerals (mg/L) (continued)		
Mercury	<0.0002	<0.0002
Molybdenum	<0.025	<0.025
Nickel	<0.05	<0.05
	<0.002	<0.002
Nitrate (as NO_3)	12	12.4
	10.6	12.3
Nitrite (as NO_2)	<0.07	<0.07
Orthophosphate	0.14	0.14
	0.13	0.14
Total phosphorus (as PO_4)	0.07	0.05
Potassium	1.5	1.3
Selenium	<0.002	<0.005
Silver	<0.001	<0.001
Sodium	106	106
Sulfate	68.3	65.8
	68.2	65.9
Surfactants	<0.05	<0.05
Thallium	<0.001	<0.001
Vanadium	<0.01	<0.02
Zinc	0.012	0.013
	<0.02	<0.02
Semivolatile organic compounds (µg/L)[c]	nd[d]	nd
Benzoic acid	39	57
Nitrogen-based herbicides (µg/L)[e]	nd	nd
Glyphosate (Roundup) (µg/L)	<20	<5
Diuron (µg/L)	<0.1	<1
Other parameters		
Field pH (pH units)	7.43	7.24
		7.19
Field specific conductance (µmho/cm)	905	1080
		693
Nitrite (as N)	<0.02	<0.02
	<0.1	<0.02
Nitrate (as N)	2.7	2.8
	2.7	2.9

Table 8-10. Livermore site downgradient Well W-373 (near TFC) (concluded).

	1st Quarter[a]	3rd Quarter[b]
Radioactivity (Bq/L)		
Gross alpha	0.1	0.07
Gross beta	0.1	0.02
Radioisotopes (Bq/L)		
Radium-226	na[f]	0.007
Radium-228	na	0.01
Tritium	10.8	11.4
Radioisotopes by alpha spectroscopy (mBq/L)		
Plutonium-238	na	0.12
Plutonium-239/240	na	0.06
Thorium-228	na	0.52
Thorium-230	na	<0.9
Thorium-232	na	0.03
Uranium-234/233 (Bq/L)	0.0436	0.056
Uranium-235/236 (Bq/L)	0.0029	0.004
Uranium-238 (Bq/L)	0.02759	0.04
Radioisotopes by gamma spectroscopy (Bq/L)[g]		
Lead-214	nd	0.32

a First quarter samples collected on 3/12/97.

b Third quarter samples collected on 8/19/97 (for radioisotopes) and 9/22/97 (for others).

c No other compounds in this suite were detected.

d nd = Not detected.

e No compounds in this suite were detected.

f na = Not analyzed.

g Only lead-214 was detected at an activity above the reporting limit.

Table 8-11. Livermore site downgradient Well W-556 (near TFC).

	1st Quarter[a]	3rd Quarter[b]
General indicator parameters		
pH (pH units)	8.63	7.7
Specific conductance (µmho/cm)	925	973
Total dissolved solids (mg/L)	525	567
Water temperature (°C)	18.4	18.2
Metals and minerals (mg/L)		
Bicarbonate alkalinity (as $CaCO_3$)	211	233
Carbonate alkalinity (as $CaCO_3$)	30	<1
Hydroxide alkalinity (as $CaCO_3$)	<1	<1
Total alkalinity (as $CaCO_3$)	241	233
Aluminum	<0.05	<0.05
	<0.05	<0.1
Antimony	<0.004	<0.005
Arsenic	<0.002	<0.002
Barium	0.076	0.086
Beryllium	<0.0002	<0.0005
Boron	1.1	1.1
Bromide	0.3	0.32
Cadmium	<0.0005	<0.0005
Calcium	62	61
Chloride	110	129
	109	122
Chromium	0.03	0.031
Cobalt	<0.05	<0.05
Copper	<0.01	<0.01
	0.0013	<0.001
Cyanide	<0.02	<0.02
Fluoride	0.32	0.29
	0.28	0.27
Total hardness (as $CaCO_3$)	245	243
Chromium(VI)	0.03	0.03
Iron	<0.05	<0.05
	<0.05	<0.1
Lead	<0.005	<0.005
Magnesium	22	22
Manganese	<0.01	<0.01
	<0.01	<0.03

Table 8-11. Livermore site downgradient Well W-556 (near TFC) (continued).

	1st Quarter[a]	3rd Quarter[b]
Metals and minerals (mg/L) (continued)		
Mercury	<0.0002	<0.0002
Molybdenum	<0.025	<0.025
Nickel	<0.05	<0.05
	<0.002	<0.002
Nitrate (as NO_3)	26.1	30.1
	27.4	28.3
Nitrite (as NO_2)	<0.07	<0.07
Orthophosphate	0.18	0.17
	0.18	0.17
Total phosphorus (as PO_4)	0.1	0.07
Potassium	1.8	1.6
Selenium	<0.002	<0.005
Silver	<0.001	<0.001
Sodium	108	100
Sulfate	41.4	36.8
Sulfate	41.4	34.9
Surfactants	<0.05	<0.05
Thallium	<0.001	<0.001
Vanadium	<0.01	<0.02
Zinc	0.04	0.014
	<0.02	<0.02
Semivolatile organic compounds (µg/L)[c]	nd[d]	nd
Nitrogen-based herbicides (µg/L)[c]	nd	nd
Butylbenzylphthalate	nd	1.6
Diethylhexylphthalate	nd	5
Glyphosate (Roundup) (µg/L)	<20	<5
Diuron (µg/L)	<0.1	<1
Other parameters		
Field pH (pH units)	7.68	7.36
		7.17
Field specific conductance (µmho/cm)	272	766
		977
Nitrite (as N)	<0.02	<0.02
	<0.02	<0.02
Nitrate (as N)	5.9	6.8
	6.2	6.4

Table 8-11. Livermore site downgradient Well W-556 (near TFC) (concluded).

	1st Quarter[a]	3rd Quarter[b]
Radioactivity (Bq/L)		
Gross alpha	0.07	0.07
Gross beta	0.1	0.02
Radioisotopes (Bq/L)		
Radium-226	0.004	0.004
Radium-228	<0.14	–0.04
Tritium	<1.18	<1.33
Radioisotopes by alpha spectroscopy (mBq/L)		
Plutonium-238	na[e]	<0.89
Plutonium-239+240	na	–0.07
Thorium-228	na	0.4
Thorium-230	na	0.04
Thorium-232	na	–0.2
Uranium-234/233 (Bq/L)	0.056	0.057
Uranium-235/236 (Bq/L)	0.0054	0.003
Uranium-238 (Bq/L)	0.0396	0.039
Radioisotopes by gamma spectroscopy (Bq/L)[f]		
Bismuth-214	na	0.67
Lead-212	na	0.29
Lead-214	na	0.422

a First quarter samples collected on 3/5/97.

b Third quarter samples collected on 8/19/97 (for radioisotopes) and 9/22/97 (for others).

c All compounds in this suite were not detected.

d nd = Not detected.

e na = Not analyzed.

f Only bismuth-214, lead-212, and lead-214 were detected at an activity above the reporting limit.

Table 8-12. Livermore site downgradient Well W-571 (near TFB).[(a)]

	3rd Quarter[(b)]
General indicator parameters	
pH (pH units)	7.71
Specific conductance (µmho/cm)	842
Total dissolved solids (mg/L)	500
Water temperature (°C)	18.6
	19.3
Metals and minerals (mg/L)	
Bicarbonate alkalinity (as $CaCO_3$)	242
Carbonate alkalinity (as $CaCO_3$)	<1
Hydroxide alkalinity (as $CaCO_3$)	<1
Total alkalinity (as $CaCO_3$)	242
Aluminum	<0.05
	<0.05
Antimony	<0.004
Arsenic	<0.002
Barium	<0.1
Beryllium	<0.0002
Boron	0.64
Bromide	0.38
Cadmium	<0.001
Calcium	66
Chloride	82.4
	82.8
Chromium	0.02
Cobalt	<0.05
Copper	<0.01
	0.0074
Cyanide	<0.02
Fluoride	0.34
	0.35
Total hardness (as $CaCO_3$)	268
Chromium(VI)	0.021
Iron	<0.05
	<0.05
Lead	<0.005
Magnesium	25
Manganese	<0.01
	<0.01

Table 8-12. Livermore site downgradient Well W-571 (near TFB)[a] (continued)

	3rd Quarter[b]
Metals and minerals (mg/L) (continued)	
Mercury	<0.0002
Molybdenum	<0.05
Nickel	<0.05
	<0.01
Nitrate (as NO_3)[c]	31.4
	31.4
Nitrite (as NO_2)	<0.07
Orthophosphate	0.2
	0.2
Total phosphorus (as PO_4)	0.08
Potassium	2.6
Selenium	<0.005
Silver	<0.002
Sodium	75
Sulfate	30.9
	31
Surfactants	<0.05
Thallium	<0.001
Vanadium	<0.01
Zinc	0.012
	<0.01
Semivolatile organic compounds (µg/L)[d]	nd[e]
Nitrogen-based herbicides (µg/L)[d]	nd
Glyphosate (Roundup) (µg/L)	<5
Diuron (µg/L)	<1
Other parameters	
Field pH (pH units)	7.33
	7.62
Field specific conductance (µmho/cm)	709
	784
Nitrite (as N)	<0.02
	<0.02
Nitrate (as N)	7.1
	7.1
Radioactivity (Bq/L)	
Gross alpha	0.3
Gross beta	0.1

Table 8-12. Livermore site downgradient Well W-571 (near TFB)[(a)] (concluded)

	3rd Quarter[(b)]
Radioisotopes (mBq/L)	
Radium-226	0[(f)]
Radium-228	–0.032
Tritium	1.6
Radioisotopes by alpha spectroscopy (mBq/L)	
Plutonium-238	0.14
Plutonium-239/240	–0.07
Thorium-228	–0.85
Thorium-230	–0.44
Thorium-232	–0.3
Uranium-234/233 (Bq/L)	0.0655
Uranium-235/236 (Bq/L)	0.008
Uranium-238 (Bq/L)	0.048
Radioisotopes by gamma spectroscopy (Bq/L)[(g)]	
Bismuth-214	0.455
Lead-214	0.35

a First quarter samples not collected because well inaccessible due to construction.

b Third quarter samples collected on 8/19/97 (for radioisotopes) and 9/18/97 (for others).

c Nitrate (as NO_3) was analyzed at 35.4 mg/L in the second quarter.

d No compounds in this suite were detected.

e nd = Not detected.

f Laboratory reported concentration as 0 ±1 pCi/L.

g Only bismuth-214 and lead-214 were detected at an activity above the reporting limit.

Table 8-13. Nitrate concentrations in selected Livermore site wells, 1997.

Well location	Sampling date	Nitrate as NO_3 (mg/L)
W-1012	3/05	88.6/93.0
	6/13	84.2
	9/22	79.7/76.6
W-1013	9/22	39.0
W-705	9/22	36.8
W-617	9/24	31.9
W-654	6/25	27.0/29.7
W-1226	2/26	27.0
W-422	9/24	25.3

Table 8-14. Tritium activity in Livermore Valley wells, 1997.

Location	Sampling date	Tritium activity (Bq/L)
11B1	9/29	8.29 ± 1.49
12A2	9/29	3.70 ± 1.45
12D2	9/29	9.51 ± 1.53
12G1	9/29	4.44 ± 1.47
16L5	8/6	1.21 ± 1.21
16L7	8/6	1.16 ± 1.16
17D2	10/1	1.19 ± 1.19
18A1	10/1	1.16 ± 1.16
1H3	9/29	1.33 ± 1.33
1P2	9/29	3.57 ± 1.41
1R2	9/29	2.30 ± 1.38
2R1	9/29	2.27 ± 1.38
004	8/5	1.19 ± 1.19
9M2	10/1	1.15 ± 1.15
9M3	10/1	1.12 ± 1.12
16B1	6/17	1.60 ± 1.35
7C2	9/29	2.40 ± 1.37
7P3	6/17	1.32 ± 1.32
8F1	6/17	1.31 ± 1.31
8P1	6/17	3.15 ± 1.42
9Q1	6/17	1.31 ± 1.31

Table 8-15. Livermore site Well W-204, downgradient from the Taxi Strip Area.

	3rd Quarter[(a)]
Radioisotopes by alpha spectroscopy (mBq/L)	
Plutonium-238	0.2
Plutonium-239/240	–0.07
Thorium-228	3.7
Thorium-230	2.1
Thorium-232	3.2
Uranium-234/233 (Bq/L)	0.028
Uranium-235/236 (Bq/L)	0.00063
Uranium-238 (Bq/L)	0.02
Radioisotopes by gamma spectroscopy (Bq/L)[(b)]	
Bismuth-214	0.84
Lead-214	0.788

a Third quarter samples collected on 8/20/97.

b Only bismuth-214 and lead-214 were detected at an activity above the reporting limit.

Table 8-16. Livermore site Well W-363, downgradient from the Taxi Strip Area.

	1st Quarter[(a)]	2nd Quarter[(b)]	3rd Quarter[(c)]	4th Quarter[(d)]
Radioisotopes (Bq/L)				
Uranium-234/233	na[(e)]	na	0.03	na
Uranium-235/236	na	na	0.0021	na
Uranium-238	na	na	0.0176	na
Tritium	370	330	na	270
Radioisotopes by alpha spectroscopy (mBq/L)[(f)]				
Plutonium-238	na	na	0.21	na
Plutonium-239/240	na	na	0.16	na
Thorium-228	na	na	–0.44	na
Thorium-230	na	na	0.1	na
Thorium-232	na	na	0.2	na
Radioisotopes by gamma spectroscopy (Bq/L)[(f)]				

a First quarter samples collected on 2/19/97.

b Second quarter samples collected on 4/21/97.

c Third quarter samples collected on 8/20/97.

d Fourth quarter samples collected on 12/9/97.

e na = Not analyzed.

f No radionuclides with activities above the reporting limit were detected.

Table 8-17. Livermore site Well W-119, downgradient from the East Traffic Circle Area.

	3rd Quarter[(a)]
Radioisotopes by alpha spectroscopy (mBq/L)	
Plutonium-238	–0.07
Plutonium-239/240	0.07
Thorium-228	–0.4
Thorium-230	0.3
Thorium-232	–0.3
Uranium-234/233 (Bq/L)	0.21
Uranium-235/236 (Bq/L)	0.01
Uranium-238 (Bq/L)	0.16
Radioisotopes by gamma spectroscopy (Bq/L)[(b)]	
Americium-241	0.34
Bismuth-214	0.44
Lead-214	0.577

a Third quarter samples collected on 7/24/97.

b Americium-241, bismuth-214, and lead-214 were detected at an activity above the reporting limit.

Table 8-18. Livermore site Well W-1308, downgradient from the East Traffic Circle Area.

	3rd Quarter[a]
Radioactivity (Bq/L)	
Gross alpha	0.1
Gross beta	0.1
Radioisotopes by alpha spectroscopy (mBq/L)	
Plutonium-238	0.085
Plutonium-239/240	–0.085
Thorium-228	–0.7
Thorium-230	0.07
Thorium-232	–0.2
Uranium-234/233 (mBq/L)	0.085
Uranium-235/236 (mBq/L)	0.0044
Uranium-238 (mBq/L)	0.0633
Tritium (mBq/L)	16.1
Radioisotopes by gamma spectroscopy (Bq/L)[b]	
Lead-214	0.4

a Third quarter samples collected on 8/13/97 to 8/20/97.

b Only lead-214 was detected at an activity above the reporting limit.

Table 8-19. Livermore site Well W-1303, downgradient from the East Traffic Circle Area.

	3rd Quarter[a]
Radioisotopes by alpha spectroscopy (mBq/L)	
Plutonium-238	<0.3
Plutonium-239/240	–0.1
Thorium-228	–0.9
Thorium-230	0.3
Thorium-232	0.03
Uranium-234/233 (Bq/L)	0.146
Uranium-235/236 (Bq/L)	0.0065
Uranium-238 (Bq/L)	0.109
Radioisotopes by gamma spectroscopy (Bq/L)[b]	
Bismuth-214	0.459
Lead-214	0.507

a Third quarter samples collected on 9/13/97.

b Only bismuth-214 and lead-214 were detected at an activity above the reporting limit.

Table 8-20. Livermore site Well W-906, downgradient from the East Traffic Circle Area.

	3rd Quarter[a]
Radioisotopes by alpha spectroscopy (mBq/L)	
Plutonium-238	0.07
Plutonium-239/240	–0.4
Thorium-228	–0.89
Thorium-230	<1
Thorium-232	<0.8
Uranium-234/233 (Bq/L)	0.2
Uranium-235/236 (Bq/L)	0.0094
Uranium-238 (Bq/L)	0.149
Radioisotopes by gamma spectroscopy (Bq/L)[b]	

a Third quarter samples collected on 8/20/97.

b No radionuclides were detected at an activity above the reporting limit.

Table 8-21. Livermore site Well W-594, downgradient from the Mixed-Waste Storage Area.

	3rd Quarter[a]
Radioisotopes by alpha spectroscopy (mBq/L)	
Plutonium-238	<0.8
Plutonium-238[b]	–0.153
Plutonium-238[c]	0.1
Plutonium-239/240	–0.3
Plutonium-239/240[b]	–0.024
Plutonium-239/240[c]	–0.038
Thorium-228	5.29
Thorium-230	4
Thorium-232	6.25
Uranium-234/233 (Bq/L)	0.088
Uranium-235/236 (Bq/L)	0.006
Uranium-238 (Bq/L)	0.070
Radioisotopes by gamma spectroscopy (Bq/L)[d]	
Lead-214	0.63

a Third quarter samples collected on 8/18/97.

b Before filtration.

c After filtration.

d Only lead-214 was detected at an activity above the reporting limit.

Table 8-22. Livermore site Well W-593, downgradient from the Mixed-Waste Storage Area.

	4th Quarter[a]
General indicator parameters	
pH (pH units)	7.7
Specific conductance (µmho/cm)	2280
Total dissolved solids (TDS)	1380
Water temperature (°C)	19.9
Metals and minerals (mg/L)	
Bicarbonate alkalinity (as $CaCO_3$)	260
Carbonate alkalinity (as $CaCO_3$)	<1
Hydroxide alkalinity (as $CaCO_2$)	<1
Total alkalinity (as $CaCO_3$)	260
Aluminum	<0.05
Antimony	<0.004
Arsenic	<0.002
Barium	<0.025
Beryllium	<0.0002
Boron	7.2
Bromide	1.7
Cadmium	<0.0005
Calcium	85
Chloride	442
	448
Chromium	0.0075
Cobalt	<0.05
Copper	<0.01
Cyanide	<0.02
Fluoride	1.2
	1.2
Total hardness (as $CaCO_3$)	400
Chromium(VI)	0.009
Iron	<0.05
Lead	<0.005
Magnesium	46
Manganese	<0.01
Mercury	<0.0002
Molybdenum	<0.025
Nickel	0.0066
Nitrate (as NO_3)	21
	22
Nitrite (as NO_2)	<0.07

Table 8-22. Livermore site Well W-593, downgradient from Mixed-Waste Storage Area (concluded).

	4th Quarter[a]
Metals and minerals (mg/L) (continued)	
Orthophosphate	0.06
	0.06
Total phosphorus (as PO_4)	0.05
Potassium	1.8
Selenium	<0.005
Silver	<0.001
Sodium	301
Sulfate	210
	212
Surfactants	<0.05
Thallium	<0.001
Vanadium	0.019
Zinc	<0.02
Semivolatile organic compounds (µg/L)[b]	nd[c]
Nitrogen-based herbicides (µg/L)[d]	
Atrazine	0.33
Glyphosate (Roundup) (µg/L)	<9
Diuron (µg/L)	<1
Other parameters	
Field pH (pH units)	7.16
Field specific conductance (µmho/cm)	2400
Nitrite (as N)	<0.02
	<0.02
Nitrate (as N)	4.9
	4.8
Radioactivity (Bq/L)	
Gross alpha	0.25
Gross beta	0.16
Radioisotopes (Bq/L)	
Radium-226	0.00437
Uranium-234/233	0.146
Uranium-235/236	0.0054
Uranium-238	0.109
Tritium	<1.31
Radon-222	12.8

a Fourth quarter samples collected on 12/29/97.

b No compounds in this suite were detected.

c nd = Not detected.

d No other compounds in this suite were detected.

Table 8-23. Livermore site Well W-007, downgradient from the Mixed-Waste Storage Area.

	3rd Quarter[a]
Radioisotopes by alpha spectroscopy (mBq/L)	
Plutonium-238	0.1
Plutonium-238[b]	–0.05
Plutonium-238[c]	–0.05
Plutonium-239/240	–0.06
Plutonium-239/240[b]	–0.01
Plutonium-239/240[c]	–0.07
Thorium-228	0.3
Thorium-230	–0.52
Thorium-232	–0.28
Uranium-234/233 (Bq/L)	0.0973
Uranium-235/236 (Bq/L)	0.00747
Uranium-238 (Bq/L)	0.071
Radioisotopes by gamma spectroscopy (Bq/L)[d]	
Bismuth-214	1.1
Lead-214	0.78

a Third quarter samples collected on 8/18/97.

b Total (before filtration).

c Soluble (after filtration).

d Only bismuth-214 and lead-214 were detected at an activity above the reporting limit.

Table 8-24. Livermore site downgradient Well W-217 (near TFF).

	1st Quarter[a]
Radioisotopes (Bq/L)	
Radium-226	<0.008
Radioisotopes by gamma spectroscopy (Bq/L)[b]	

a First quarter samples collected on 3/13/97.

b No radionuclides were detected at an activity above the reporting limit.

Table 8-25. Livermore site downgradient Well W-270 (near TFF).

	1st Quarter[(a)]
Radioisotopes (Bq/L)	
Radium 226	<0.008
Radioisotopes by gamma spectroscopy (Bq/L)[(b)]	

a First quarter samples collected on 3/13/97.

b No radionuclides were detected at an activity above the reporting limit.

Table 8-26. Livermore site Well W-307, downgradient from Buildings 322/321.

Metals (mg/L)	3rd Quarter[(a)]
Aluminum	<0.1
Antimony	<0.005
Arsenic	<0.002
Barium	0.3
Beryllium	<0.0005
Boron	0.67
Cadmium	<0.0005
Chromium	0.012
Cobalt	<0.05
Copper	<0.01
Iron	<0.1
Lead	<0.005
Manganese	<0.03
Mercury	<0.0002
Molybdenum	<0.025
Nickel	<0.002
Selenium	<0.005
Silver	<0.001
Thallium	<0.001
Vanadium	<0.02
Zinc	<0.02

a Third quarter samples collected on 9/23/97.

Table 8-27. Livermore site Well W-226, downgradient from the Building 253 catch basin.

Metals (mg/L)	3rd Quarter[(a)]
Aluminum	<0.05
Antimony	<0.004
Arsenic	<0.002
Barium	0.14
Beryllium	<0.0002
Boron	0.57
Cadmium	<0.0005
Chromium	0.028
Cobalt	<0.05
Copper	0.0013
Chromium(VI)	0.026
Iron	<0.05
Lead	<0.005
Manganese	<0.01
Mercury	<0.0002
Molybdenum	<0.025
Nickel	<0.002
Selenium	<0.005
Silver	<0.001
Thallium	<0.001
Vanadium	<0.01
Zinc	<0.01

a Third quarter samples collected on 9/24/97.

Table 8-28. Livermore site Well W-306, downgradient from the Building 253 catch basin.

Metals (mg/L)	3rd Quarter[(a)]
Aluminum	<0.1
Antimony	<0.005
Arsenic	<0.002
Barium	<0.1
Beryllium	<0.0005
Boron	1.3
Cadmium	<0.0005
Chromium	0.046
Cobalt	<0.05
Copper	<0.01
Iron	<0.1
Lead	<0.005
Manganese	<0.03
Mercury	<0.0002
Molybdenum	<0.025
Nickel	<0.002
Selenium	<0.005
Silver	<0.001
Thallium	<0.001
Vanadium	<0.02
Zinc	<0.02

a Third quarter samples collected on 9/23/97.

Table 8-29. Site 300 Pit 6 Well K6-01.

Constituent of concern	Sampled	
	5/28/97	12/16/97
Element (μg/L)		
Antimony	<5	<5
Arsenic	16	16
Barium	40	34
Beryllium	<0.5	34
Cadmium	<0.5	<0.5
Chromium	1.3	1.3
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	5.6	<5
Selenium	<2	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	<25	<25
Zinc	<20	<20
Inorganic compounds (mg/L)		
Nitrate	<0.5	<0.4
HE compounds (μg/L)		
HMX, RDX	<5	<5
Organic compounds (μg/L)[a]		
Volatile (EPA 601)	nd[b]	nd
Semivolatile (EPA 625)	—[c]	nd
Pesticides and PCBs (EPA 608)	—[c]	nd
Radioactivity (Bq/L)		
Gross alpha	0.05	0.000
Gross beta	0.38	0.38
Tritium	0.36	–0.4
Uranium (total)	0.03	0.03

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-30. Site 300 Pit 6 Well K6-03.

Constituent of concern	Sampled	
	5/28/97	12/16/97
Element (μg/L)		
Antimony	<5	<5
Arsenic	20	21
Barium	<25	<25
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	1.1	1.1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum	25	<25
Nickel	<5	<5
Selenium	<2	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	<25	<25
Zinc	<20	<20
Inorganic compounds (mg/L)		
Nitrate	<0.5	<0.4
HE compounds (μg/L)		
HMX, RDX	<5	<5
Organic compounds[a]		
Volatile (EPA 601)	nd[b]	nd
Semivolatile (EPA 625)	—[c]	nd
Pesticides and PCBs (EPA Method 608)	—[c]	nd
Radioactivity (Bq/L)		
Gross alpha	–0.04	0.01
Gross beta	0.34	0.32
Tritium	–0.04	–0.6
Uranium (total)	0.03	0.02

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-31. Site 300 Pit 6 Well K6-04.

Constituent of concern	Sampled	
	5/29/97	12/17/97
Element (μg/L)		
Antimony	<5	<5
Arsenic	15	19
Barium	<25	<25
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	<1	1.4
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	2.7	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	<25	<25
Zinc	<20	<20
Inorganic compounds (mg/L)		
Nitrate	6.5	6.2
HE compounds (μg/L)		
HMX, RDX	<5	<5
Organic compounds[a]		
Volatile (EPA Method 601)	nd[b]	nd
Semivolatile (EPA 625)	—[c]	nd
Pesticides and PCBs (EPA 608)	—[c]	nd
Radioactivity (Bq/L)		
Gross alpha	0.07	0.02
Gross beta	0.33	0.30
Tritium	–1.10	–0.01
Uranium (total)	0.06	0.05

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-32. Site 300 Pit 6 Well EP6-07.

Constituent of concern	Sampled	
	5/29/97	12/17/97
Element (µg/L)		
Antimony	<5	<5
Arsenic	22	24
Barium	<25	25
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	<1	1.4
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	0.24
Molybdenum	26	<25
Nickel	<5	<5
Selenium	<2	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	<25	<25
Zinc	<20	<20
Inorganic compounds (mg/L)		
Nitrate	<0.5	<0.4
Organic compounds[a]		
Volatile (EPA Method 601)	nd[b]	nd
Semivolatile (EPA 625)	—[c]	nd
Pesticides and PCBs (EPA 608)	—[c]	nd
HE compounds (µg/L)		
HMX, RDX	<5	<5
Radioactivity (Bq/L)		
Gross alpha	0.004	–0.02
Gross beta	0.23	0.31
Tritium	–0.46	–0.01
Uranium (total)	0.02	0.02

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-33. Site 300 Pit 6 Well EP6-08.

Constituent of concern	Sampled[a] 12/17–19/97
Element (µg/L)	
Antimony	<5
Arsenic	14
Barium	29
Beryllium	<0.5
Cadmium	<0.5
Chromium	2.1
Cobalt	<25
Copper	<10
Lead	<2
Mercury	<0.2
Molybdenum	<25
Nickel	<5
Selenium	5
Silver	<0.5
Thallium	<1
Vanadium	<25
Zinc	<20
Inorganic compounds (mg/L)	
Nitrate	1.3
Organic compounds[b]	
Volatile (EPA Method 601)	nd[c]
chloroform (µg/L)	3.4
Semivolatile (EPA 625)	nd
Pesticides and PCBs (EPA 608)	nd
HE compounds (µg/L)	
HMX, RDX	<5
Radioactivity (Bq/L)	
Gross alpha	0.36
Gross beta	0.30
Tritium	0.3
Uranium (total)	0.36

a Pump inoperative until replaced 10/20/97.

b See Table 8-2 for method constituents and their reporting limits.

c nd = Not detected above reporting limits, except as listed.

Table 8-34. Site 300 Pit 6 Well EP6-09.

Constituent of concern	Sampled 5/28/97	Sampled 12/16/97
Element (μg/L)		
Antimony	<5	<5
Arsenic	15	17
Barium	<25	<25
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	1.4	1.2
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	3.3	2.5
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	<25	<25
Zinc	<20	<20
Inorganic compounds (mg/L)		
Nitrate	4.0	4.2
HE compounds (μg/L)		
HMX, RDX	<5	<5
Organic compounds (μg/L)[a]		
Volatile (EPA 601)	nd[b]	nd
1,2-Dichloroethane (1,2-DCA)		0.6
Trichloroethene (TCE)	15	16
Semivolatile (EPA 625)	—[c]	nd
Pesticides and PCBs (EPA 608)	—[c]	nd
Radioactivity (Bq/L)		
Gross alpha	0.07	0.05
Gross beta	0.36	0.32
Tritium	–0.08	–0.3
Uranium (total)	0.07	0.09

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-35. Site 300 Pit 8 wells.

Constituent of concern	Wells K8-01 Sampled 4/30/97	K8-01 12/18/97	K8-02B 4/30/97	K8-02B 12/18/97	K8-03B 4/25/97
Elements (µg/L)					
Antimony	<5	<5	<5	<5	<5
Arsenic	19	19	24	28	18
Barium	<25	<25	<25	<25	<25
Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	17	16	<1	2.5	1.9
Cobalt	<25	<25	<25	<25	<25
Copper	<10	<10	<10	<10	<10
Lead	<2	<2	<2	<2	<2
Mercury	<0.2	<0.2	<0.2	<0.2	<0.2
Molybdenum	<25	<25	<25	<25	<25
Nickel	<5	<5	<5	<5	<5
Selenium	2.2	8.1	5.4	17	<2
Silver	<0.5	<0.5	<0.5	0.5	<0.5
Thallium	<1	<1	<1	<1	<1
Vanadium	74	63	70	58	76
Zinc	48	<20	<20	<20	<20
Organic compounds[a]					
Volatile (EPA Method 601)	nd[b]	nd	nd	nd	nd
Trichloroethene (TCE) (µg/L)	2.9	3.3	1.6	2.3	1.9
Trichloroethene (1,2-DCA) (µg/L)		1.9			
Radioactivity (Bq/L)					
Gross alpha	—[c]	0.21	—[c]	—[c]	—[c]
Gross beta	—[c]	0.23	—[c]	—[c]	—[c]
Tritium	—[c]	3.15	—[c]	1.07	—[c]
Uranium (total)	—[c]	0.33	—[c]	0.47	—[c]

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-36. Site 300 Pit 9 wells.

Constituent of concern	Well			
	K9-01	K9-02	K9-03	K9-04
	Sampled			
	8/7/97	8/7/97	8/8/97	8/11/97
Element (mg/L)				
Antimony	<5	<5	<5	<5
Arsenic	5	33	17	<2
Barium	<25	<25	<25	<25
Beryllium	<0.5	<0.5	<0.5	<0.5
Cadmium	<0.5	<0.5	<0.5	<0.5
Chromium	<1	<1	<1	<1
Cobalt	<25	<25	<25	<25
Copper	<10	<10	<10	<10
Lead	3	3	<2	<2
Mercury	<0.2	<0.2	<0.2	<0.2
Molybdenum	<25	54	29	29
Nickel	<5	<5	<5	<5
Selenium	<2	<2	<2	<2
Silver	<0.5	0.5	<0.5	<0.5
Thallium	<1	<1	<1	<1
Vanadium	<25	<25	<25	<25
Zinc	<20	<20	<20	<20
Inorganic compounds (mg/L)				
Nitrate	<0.5	<0.5	<0.5	<0.5
HE compounds (µg/L)				
HMX, RDX	<5	<5	<5	<5
Organic compounds[(a)]				
Volatile (EPA Method 601)	nd[(b)]	nd	nd	nd
Radioactivity (Bq/L)				
Gross alpha	–0.02	0.05	–0.04	0.12
Gross beta	0.31	0.33	0.38	0.43
Tritium	–1.1	–0.38	–1.7	–1.0
Uranium (total)	0.003	0.02	0.02	0.01

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

Table 8-37. Site 300 Pit 2 Barcad K1-01A.

Constituent of concern	Sampled 5/21/97
Element (μg/L)	
Antimony	<5
Arsenic	9.3
Barium	<25
Beryllium	<0.5
Cadmium	<0.5
Chromium	<1
Cobalt	<25
Copper	<10
Lead	<2
Mercury	<0.2
Molybdenum	<25
Nickel	<5
Selenium	<2
Silver	<0.5
Thallium	<1
Vanadium	<25
Zinc	21
Organic compounds[a]	
Volatile (EPA 601)	nd[b]
Inorganic compounds	
Nitrate (mg/L)	<0.5
HE compounds (μg/L)	
HMX, RDX	<5
Radioactivity (Bq/L)	
Gross alpha	–0.03
Gross beta	0.20
Tritium	–0.10
Uranium (total)	0.02

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

Table 8-38. Site 300 Pit 2 Barcad K1-01B.

Constituent of concern	Sampled 5/22/97
Element (μg/L)	
Antimony	<5
Arsenic	11
Barium	50
Beryllium	<0.5
Cadmium	<0.5
Chromium	<1
Cobalt	<25
Copper	<10
Lead	<2
Mercury	<0.2
Molybdenum	<25
Nickel	<5
Selenium	<2
Silver	<0.5
Thallium	<1
Vanadium	<25
Zinc	<20
Organic compounds[a]	
Volatile (EPA 601)	nd[b]
Inorganic compounds	
Nitrate (mg/L)	<0.5
HE compounds (μg/L)	
HMX, RDX	<5
Radioactivity (Bq/L)	
Gross alpha	0.004
Gross beta	0.15
Tritium	–0.12
Uranium (total)	0.001

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

Table 8-39. Site 300 Pit 2 Barcad K1-02A.

Constituent of concern	Sampled	
	5/21/97	12/8/97
Element (µg/L)		
Antimony	<5	<5
Arsenic	16	12
Barium	40	39
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	<1	<1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	<2	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	<25	<25
Zinc	<20	<20
Organic compounds[a]		
Volatile (EPA Method 601)	nd[b]	—[c]
Inorganic compounds		
Nitrate (mg/L)	<0.5	<0.4
HE compounds (µg/L)		
HMX, RDX	<5	<5
Radioactivity (Bq/L)		
Gross alpha	0.09	0.17
Gross beta	0.20	0.31
Tritium	–0.40	–0.6
Uranium (total)	0.07	0.07

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-40. Site 300 Pit 2 Barcad K2-01A.

Constituent of concern	Sample	
	5/22/97	12/9/97
Element (µg/L)		
Antimony	<5	<4
Arsenic	<2	<2
Barium	26	26
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.6
Chromium	<1	<1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<5
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	<2	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	<25	<10
Zinc	<20	<20
Organic compounds[a]		
Volatile (EPA Method 601)	nd[b]	—[c]
Inorganic compounds		
Nitrate (mg/L)	<0.5	<0.4
HE compounds (µg/L)		
HMX, RDX	<5	<5
Radioactivity (Bq/L)		
Gross alpha	0.07	0.03
Gross beta	0.18	0.15
Tritium	–0.10	–0.1
Uranium (total)	0.006	0.006

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-41. Site 300 Pit 2 Barcad K2-01B.

Constituent of concern	Sampled	
	5/22/97	12/9/97
Element (µg/L)		
Antimony	<5	<4
Arsenic	20	18
Barium	<25	29
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.6
Chromium	<1	<1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<5
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	<2	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	<25	<10
Zinc	<20	<20
Organic compounds[a]		
Volatile (EPA Method 601)	nd[b]	—[c]
Inorganic compounds		
Nitrate (mg/L)	<0.5	<0.4
HE compounds (µg/L)		
HMX, RDX	<5	<5
Radioactivity (Bq/L)		
Gross alpha	0.08	0.11
Gross beta	0.16	0.17
Tritium	7.44	6.4
Uranium (total)	0.11	0.15

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-42. Site 300 Pit 2 Barcad K2-02A.

Constituent of concern	Sampled	
	5/21/97	12/4/97
Element (µg/L)		
Antimony	<5	<5
Arsenic	45	42
Barium	26	25
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	<1	<1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	<2	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	<25	<25
Zinc	<20	<20
Organic compounds[a]		
Volatile (EPA Method 601)	nd[b]	—[c]
Inorganic compounds		
Nitrate (mg/L)	<0.5	<0.4
HE compounds (µg/L)		
HMX, RDX	<5	<5
Radioactivity (Bq/L)		
Gross alpha	0.19	0.13
Gross beta	0.14	0.24
Tritium	–0.34	0.30
Uranium (total)	0.17	0.16

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-43. Site 300 Pit 2 Barcad K2-02B.

Constituent of concern	Sampled	
	5/21/97	12/4/97
Element (μg/L)		
Antimony	<5	<5
Arsenic	<2	<2
Barium	<25	25
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	<1	<1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	<2	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	<25	<25
Zinc	64	<20
Organic compounds[a]		
Volatile (EPA Method 601)	nd[b]	—[c]
Inorganic compounds		
Nitrate (mg/L)	<0.5	<0.4
HE compounds (μg/L)		
HMX, RDX	<5	<5
Radioactivity (Bq/L)		
Gross alpha	0.01	0.03
Gross beta	0.20	0.17
Tritium	0.65	0.70
Uranium (total)	0.005	0.004

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-44. Site 300 Elk Ravine Well K7-07.

Constituent of concern	Sampled	
	5/13/97	11/18/97
Element (µg/L)		
Antimony	<5	<5
Arsenic	15	13
Barium	77	85
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	<1	<1
Cobalt	<25	<25
Copper	<10	<10
Lead	2.1	<2
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	<2	3.6
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	30	<25
Zinc	<20	<20
HE compounds (µg/L)		
HMX, RDX	<5	<5
Organic compounds[a]		
Volatile (EPA 601)	nd[b]	nd
Inorganic compounds (mg/L)		
Nitrate	—[c]	27
Radioactivity (Bq/L)		
Gross alpha	0.30	0.31
Gross beta	0.21	0.16
Tritium	150	284
Uranium (total)	0.27	0.28

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-45. Site 300 Elk Ravine Well NC7-61.

Constituent of concern	Sampled	
	5/13/97	11/18/97
Element (mg/L)		
Antimony	<5	<5
Arsenic	16	14
Barium	130	120
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	2.7	2.1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	2.1
Mercury	0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	<2	3.7
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	90	84
Zinc	22	<20
HE compounds (µg/L)		
HMX, RDX	<5	<5
Organic compounds[a]		
Volatile (EPA 601)	nd[b]	nd
Inorganic compounds (mg/L)		
Nitrate	—[c]	75
Radioactivity (Bq/L)		
Gross alpha	0.41	0.12
Gross beta	0.27	0.19
Tritium	6030	5883
Uranium (total)	0.26	0.25

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-46. Site 300 Elk Ravine Well NC7-69.

Constituent of concern	Sampled	
	5/13/97	11/18/97
Element (µg/L)		
Antimony	<5	<5
Arsenic	<2	<2
Barium	28	<25
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	<1	<1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	<2	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	<25	<25
Zinc	<20	<20
HE compounds (µg/L)		
HMX, RDX	<5	<5
Organic compounds[(a)]		
Volatile (EPA 601)	nd[(b)]	nd
Inorganic compounds (mg/L)		
Nitrate	—[(c)]	<0.4
Radioactivity (Bq/L)		
Gross alpha	0.16	0.07
Gross beta	0.16	0.17
Tritium	–1.40	1.2
Uranium (total)	0.01	0.004

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-47. Site 300 Elk Ravine Well K2-04D.

Constituent of concern	Sampled	
	5/14/97	11/24/97
Element (μg/L)		
Antimony	<5	<5
Arsenic	11	12
Barium	38	43
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	1.8	2.9
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	0.2
Molybdenum	<25	<25
Nickel	<5	9
Selenium	<2	2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	56	59
Zinc	<20	<20
Inorganic compounds		
Nitrate (mg/L)	—[a]	33
HE compounds (μg/L)		
HMX, RDX	<5	<5
Organic compounds[b]		
Volatile (EPA 601)	nd[c]	nd
Radioactivity (Bq/L)		
Gross alpha	0.07	0.11
Gross beta	0.13	0.12
Tritium	145	126
Uranium (total)	0.10	0.11

a Analysis not planned.

b See Table 8-2 for method constituents and their reporting limits.

c nd = Not detected above reporting limits, except as listed.

Table 8-48. Site 300 Elk Ravine Well K2-04S.

Constituent of concern	Sampled	
	5/14/97	11/18/97
Element (µg/L)		
Antimony	<5	<5
Arsenic	16	13
Barium	71	<25
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	1.7	<1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	<2	4.8
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	58	45
Zinc	27	<20
HE compounds (µg/L)		
HMX, RDX	<5	<5
Organic compounds[a]		
Volatile (EPA 601)	nd[b]	nd
Inorganic compounds (mg/L)		
Nitrate	—[c]	53
Radioactivity (Bq/L)		
Gross alpha	0.27	0.11
Gross beta	0.16	0.15
Tritium	1100	1018
Uranium (total)	0.20	0.19

a Analysis not planned.

b See Table 8-2 for method constituents and their reporting limits.

c nd = Not detected above reporting limits, except as listed.

Table 8-49. Site 300 Elk Ravine Well K2-01C.

Constituent of concern	Sampled 5/19/97	
	Routine result	Duplicate result
Element (μg/L)		
Antimony	<5	<5
Arsenic	7.2	6.6
Barium	34	36
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	<1	<1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	<2	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	47	44
Zinc	<20	21
HE compounds (μg/L)		
HMX, RDX	<5	<5
Organic compounds[a]		
Volatile (EPA 601)	nd[b]	nd
Radioactivity (Bq/L)		
Gross alpha	0.33	0.30
Gross beta	0.31	0.25
Tritium	551	555
Uranium (total)	0.32	0.33

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

Table 8-50. Site 300 Elk Ravine Well NC2-11D.

Constituent of concern	Sampled	
	5/15/97	12/2/97
Element (μg/L)		
Antimony	<5	<5
Arsenic	14	11
Barium	<25	<25
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	1	<1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	18
Selenium	2.3	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	52	52
Zinc	28	<20
Inorganic compounds (mg/L)		
Nitrate	—[(a)]	27
HE compounds (μg/L)		
HMX, RDX	<5	<5
Organic compounds[(b)]		
Volatile (EPA 601)	nd[(c)]	nd
Radioactivity (Bq/L)		
Gross alpha	0.21	0.24
Gross beta	5.1	0.23
Tritium	109	103
Uranium (total)	0.21	0.20

a Analysis not planned.

b See Table 8-2 for method constituents and their reporting limits.

c nd = Not detected above reporting limits, except as listed.

Table 8-51. Site 300 Elk Ravine Well NC2-12D.

Constituent of concern	Sampled	
	5/15/97	11/25/97
Element (µg/L)		
Antimony	<5	<5
Arsenic	13	12
Barium	<25	<25
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	<1	<1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum		<25
Nickel	<5	6.4
Selenium	2.3	2.7
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	49	<25
Zinc	<20	<20
Inorganic compounds (mg/L)		
Nitrate	—[a]	26
HE compounds (µg/L)		
HMX, RDX	<5	<5
Organic compounds[b]		
Volatile (EPA 601)	nd[c]	nd
Radioactivity (Bq/L)		
Gross alpha	0.07	0.19
Gross beta	0.16	0.11
Tritium	258	266
Uranium (total)	0.13	0.15

a Analysis not planned.

b See Table 8-2 for method constituents and their reporting limits.

c nd = Not detected above reporting limits, except as listed.

Table 8-52. Site 300 Elk Ravine Spring 812CRK.

Constituent of concern	Sampled		
	5/13/97	**9/16/97**	**12/1/97**
Element (µg/L)			
Antimony		<5	<5
Arsenic		16	26
Barium		130	56
Beryllium		<0.5	<0.5
Cadmium		<0.5	<0.5
Chromium		2.5	<1
Cobalt		<25	<25
Copper		<10	<10
Lead		<2	<2
Mercury		<0.2	<0.2
Molybdenum		<25	<25
Nickel		<5	<5
Selenium		<2	3.8
Silver		<0.5	<0.5
Thallium		<1	<1
Vanadium		92	56
Zinc		32	<20
Inorganic compounds			
Nitrate (mg/L)	—[a]		21
HE compounds (µg/L)			
HMX, RDX	<5		<5
Organic compounds[b]			
Volatile (EPA 601)	nd[c]		nd
Radioactivity (Bq/L)			
Gross alpha	0.15		0.14
Gross beta	0.21		0.31
Tritium	–0.24		1.18
Uranium (total)	0.23		0.25

a Analysis not planned.

b See Table 8-2 for method constituents and their reporting limits.

c nd = Not detected above reporting limits, except as listed.

Table 8-53. Site 300 Elk Ravine Well NC2-07.

Constituent of concern	Sampled	
	5/19/97	12/1/97
Element (µg/L)		
Antimony	<5	<5
Arsenic	39	37
Barium	30	35
Beryllium	<0.5	<0.5
Cadmium	<0.5	<0.5
Chromium	<1	<1
Cobalt	<25	<25
Copper	<10	<10
Lead	<2	<2
Mercury	<0.2	<0.2
Molybdenum	<25	<25
Nickel	<5	<5
Selenium	<2	<2
Silver	<0.5	<0.5
Thallium	<1	<1
Vanadium	49	52
Zinc	<20	<20
Inorganic compounds		
Nitrate (mg/L)	—[a]	17
HE compounds (µg/L)		
HMX, RDX	<5	<5
Organic compounds[b]		
Volatile (EPA 601)	nd[c]	nd
Radioactivity (Bq/L)		
Gross alpha	0.23	0.30
Gross beta	0.32	0.26
Tritium	0.52	1.12
Uranium (total)	0.29	0.31

a Analysis not planned.

b See Table 8-2 for method constituents and their reporting limits.

c nd = Not detected above reporting limits, except as listed.

Table 8-54. Site 300 potable standby supply Well 18.

Constituent of concern	Sampled			
	1/15/97	4/16/97	7/10/97	11/13/97
Organic compounds[a]				
Volatile (EPA Method 502.2)	nd[b]	nd	nd	nd
Trichlorethene (TCE) (µg/L)			0.43	0.86
Radioactivity (Bq/L)				
Gross alpha	–0.03	0.004	0.02	–0.01
Gross beta	0.26	0.27	0.19	0.21
Tritium	2.0	<1.2	<1.2	<3.7

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

Table 8-55. Site 300 potable water supply Well 20.

Constituent of concern	Sampled			
	1/24/97	4/25/97	7/29/97	10/24/97
Element (mg/L)				
Antimony	<5	<5	<5	<5
Arsenic	<2	<2	<2	<2
Barium	<25	<25	<25	<25
Beryllium	<0.5	<0.5	<0.5	<0.5
Cadmium	<0.5	<0.5	<0.5	<0.5
Chromium	<1	<1	1.3	<1
Cobalt	<25	<25	<25	<25
Copper	<10	<10	<10	<10
Lead	<2	<2	<2	<2
Mercury	<0.2	<0.2	<0.2	<0.2
Molybdenum	<25	<25	<25	<25
Nickel	<5	<5	<5	<5
Selenium	<2	<2	<2	<2
Silver	<0.5	<0.5	<0.5	<0.5
Thallium	<1	<1	<1	<1
Vanadium	<25	<25	<25	<25
Zinc	29	<20	<20	<20
Inorganic compounds				
Nitrate (mg/L)	—[a]	<2.5	<0.5	<0.5
HE compounds (µg/L)				
HMX, RDX	<5	<5	<5	<5
Organic compounds[b]				
Volatile (EPA Method 502.2)	nd[c]	nd	nd	nd
Radioactivity (Bq/L)				
Gross alpha	0.02	–0.03	–0.05	0.000
Gross beta	0.32	0.37	0.33	0.27
Tritium	–0.18	–0.38	0.92	–0.07

a Analysis not planned.

b See Table 8-2 for method constituents and their reporting limits.

c nd = Not detected above reporting limits, except as listed.

Table 8-56. Off-site Well CARNRW1.

Constituent of concern	Sampled			
	1/30/97	4/24/97	8/26/97	10/29/97
Organic compounds[a]				
Volatile (EPA 601)	nd[b]	nd	nd	nd

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

Table 8-57. Off-site Well CDF1.

Constituent of concern	Sampled			
	1/30/97	4/22/97	7/24/97	10/29/97
Element (mg/L)				
Antimony	<5	<5	<5	<5
Arsenic	2.2	3.9	4.3	4.2
Barium	31	35	33	34
Beryllium	<0.5	<0.5	<0.5	<0.5
Cadmium	<0.5	<0.5	<0.5	<0.5
Chromium	<1	1.8	<1	<1
Cobalt	<25	<25	<25	<25
Copper	<10	<10	<10	<10
Lead	<2	<2	<2	<2
Mercury	<0.2	<0.2	<0.2	<0.2
Molybdenum	<25	<25	<25	<25
Nickel	<5	5.4	<5	<5
Selenium	<2	<2	<2	<2
Silver	<0.5	<0.5	<0.5	<0.5
Thallium	<1	<1	<1	<1
Vanadium	<25	<25	<25	<25
Zinc	58	52	34	32
Explosive compounds (µg/L)				
HMX, RDX	<5	<5	<5	<5
Organic compounds[a]				
Volatile (EPA 502.2)	nd[b]	nd	nd	nd
Pesticides (EPA 608)	—[c]	—[c]	nd	—[c]
Herbicides (EPA 615)	—[c]	—[c]	nd	—[c]
Semivolatile (EPA 625)	—[c]	—[c]	nd	—[c]
Inorganic compounds				
Nitrate (mg/L)	—[c]	8.9	6.0	6.6
Radioactivity (Bq/L)				
Gross alpha	0.09	0.09	0.03	0.04
Gross beta	0.16	0.24	0.25	0.30
Tritium	–0.35	–0.24	–0.37	0.02
Uranium (total)	—[c]	—[c]	0.07	0.08

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-58. Off-site Well CON1.

Constituent of concern	Sampled			
	1/30/97	4/22/97	7/25/97	10/29/97
Element (mg/L)				
Antimony	<5	<5	<5	<5
Arsenic	2.7	2.1	3.0	<2
Barium	<25	26	<25	<25
Beryllium	<0.5	<0.5	<0.5	<0.5
Cadmium	<0.5	<0.5	<0.5	<0.5
Chromium	<1	1.3	1.2	<1
Cobalt	<25	<25	<25	<25
Copper	<10	<10	<10	<10
Lead	<2	<2	<2	<2
Mercury	<0.2	<0.2	<0.2	<0.2
Molybdenum	<25	<25	<25	<25
Nickel	<5	<5	<5	<5
Selenium	<2	<2	<2	<2
Silver	<0.5	<0.5	<0.5	<0.5
Thallium	<1	<1	<1	<1
Vanadium	<25	<25	<25	<25
Zinc	22	25	30	<20
HE compounds (µg/L)				
HMX, RDX	<5	<5	<5	<5
Organic compounds[a]				
Volatile (EPA Method 502.2)	nd[b]	nd	nd	nd
Pesticides (EPA Method 608)	—[c]	—[c]	nd	—[c]
Herbicides (EPA Method 615)	—[c]	—[c]	nd	—[c]
Semivolatile (EPA 625)	—[c]	—[c]	nd	—[c]
Inorganic compounds				
Nitrate (mg/L)	—[c]	<0.5	<0.5	<0.4
Radioactivity (Bq/L)				
Gross alpha	–0.04	0.05	–0.07	0.004
Gross beta	0.23	0.40	0.07	0.37
Tritium	–0.95	–0.83	0.43	0.00
Uranium (total)	—[c]	—[c]	0.01	0.01

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-59. Off-site Well GALLO1.

Constituent of concern	Sampled			
	2/24/97	4/24/97	7/29/97	10/24/97
Element (µg/L)				
Antimony	<5	<5	<5	<5
Arsenic	<2	4.3	4.3	5.0
Barium	<25	<25	<25	<25
Beryllium	<0.5	<0.5	<0.5	<0.5
Cadmium	<0.5	<0.5	<0.5	<0.5
Chromium	<1	1.1	<1	<1
Cobalt	<25	<25	<25	<25
Copper	<10	<10	<10	<10
Lead	<2	<2	<2	<2
Mercury	<0.2	<0.2	<0.2	<0.2
Molybdenum	44	45	41	43
Nickel	<5	<5	<5	<5
Selenium	<2	<2	<2	<2
Silver	<0.5	<0.5	<0.5	<0.5
Thallium	<1	<1	<1	<1
Vanadium	<25	<25	<25	<25
Zinc	<20	<20	<20	<20
HE compounds (µg/L)				
HMX, RDX	<5	<5	<5	<5
Organic compounds[a]				
Volatile (EPA 502.2)	nd[b]	nd	nd(exc)	nd(exc)
Trichloroethene (TCE) (µg/L)	<0.2	<0.2	0.4	0.7
Pesticides (EPA Method 608)	—[c]	—[c]	nd	—[c]
Herbicides (EPA Method 615)	—[c]	—[c]	nd	—[c]
Semivolatile (EPA 625)	—[c]	—[c]	nd	—[c]
Inorganic compounds (mg/L)				
Nitrate	<0.5	<2.5	<0.5	<0.5
Radioactivity (Bq/L)				
Gross alpha	–0.02	0.03	–0.05	–0.01
Gross beta	0.23	0.17	0.07	0.04
Tritium	–1.76	0.77	–0.31	–0.04
Uranium (total)	—[c]	—[c]	0.005	0.01

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

c Analysis not planned.

Table 8-60. Off-site Well CARNRW2.

Constituent of concern	Sampled			
	1/30/97	4/24/97	8/26/97	10/29/97
Element (μg/L)				
Antimony	<5	<5	<5	<5
Arsenic	3.6	3.8	3.6	2.4
Barium	<25	<25	<25	<25
Beryllium	<0.5	<0.5	<0.5	<0.5
Cadmium	<0.5	<0.5	<0.5	<0.5
Chromium	<1	1.6	<1	<1
Cobalt	<25	<25	<25	<25
Copper	<10	<10	<10	<10
Lead	<2	<2	<2	<2
Mercury	<0.2	<0.2	<0.2	<0.2
Molybdenum	<25	<25	<25	<25
Nickel	<5	<5	<5	<5
Selenium	<2	<2	<2	<2
Silver	<0.5	<0.5	<0.5	<0.5
Thallium	<1	<1	<1	<1
Vanadium	<25	<25	<25	<25
Zinc	<20	24	<20	200
HE compounds (μg/L)				
HMX, RDX	<5	<5	<5	<5
Organic compounds (μg/L)[a]				
Volatile (EPA 502.2)	nd[b]	nd	nd	nd
Bromodichloromethane				1.1
Bromoform				18.0
Chloroform				0.5
Dibromochloromethane				3.2
Pesticides (EPA 608)	—[c]	—[c]	nd	—[c]
Herbicides (EPA 615)	—[c]	—[c]	nd	—[c]
Semivolatile (EPA 625)	—[c]	—[c]	nd	—[c]
Inorganic compounds				
Nitrate (mg/L)	—[c]	<2.5	<0.5	0.75
Radioactivity (Bq/L)				
Gross alpha	–0.03	–0.02	0.03	–0.03
Gross beta	0.38	0.37	0.23	0.31
Tritium	–0.28	0.47	0.76	0.03
Uranium (total)	—[c]	—[c]	0.01	0.01

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits.

c Analysis not planned.

Table 8-61. Off-site Well CON2.

Constituent of concern	Sampled			
	1/30/97	4/22/97	7/28/97	10/29/97
Organic compounds[a]				
Volatile (EPA Method 601)	nd[b]	nd	nd	nd

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits.

Table 8-62. Annually monitored off-site surveillance wells.

Constituent of concern	Well					
	MUL1	MUL2	VIE1	VIE2	STN	W35A-04
	Sampled					
	9/8/97	9/8/97	9/5/97	9/4/97	9/3/97	8/28/97
Element (µg/L)						
Antimony	<5	<5	<5	<5	<5	<5
Arsenic	3.7	<2	6.9	<2.0	<2	2.8
Barium	26	<25	60	28	49	39
Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	<1	<1	<1	2.6	<1	1.6
Cobalt	<25	<25	<25	<25	<25	<25
Copper	<10	13	<10	<10	<10	<10
Lead	<2	<2	<2	6.2	<2	<2
Mercury	0.28	0.26	0.26	<0.2	<0.2	<0.2
Molybdenum	<25	<25	<25	<25	<25	<25
Nickel	<5	5.4	<5	33	9.0	5.1
Selenium	<2	<2	4.4	9.3	<2	2.4
Silver	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	<1	<1	<1	<1	<1	<1
Vanadium	<25	<25	<25	<25	<25	<25
Zinc	64	32	50	33	94	<20
Inorganic compounds (mg/L)						
Nitrate	2.8	1.2	46	33	4.8	9.5
Organic compounds[a]						
Herbicide (EPA 615)	nd[b]	nd	nd	nd	nd	nd
Pesticide (EPA 608)	nd	nd	nd	nd	nd	nd
Semi-volatile (EPA 625)	nd	nd	nd	nd	nd	nd
Volatile (EPA 502.2)	nd	nd	nd	nd	nd	nd
HE compounds (µg/L)						
HMX	<5	<5	<5	<5	<5	<5
RDX	<5	<5	<5	<5	<5	<5
Radioactivity (Bq/L)						
Gross alpha	0.23	0.05	0.01	0.43	0.59	0.28
Gross beta	0.27	0.34	0.50	0.20	0.38	0.17
Tritium	0.65	0.98	–0.77	0.74	0.29	0.35
Uranium (total)	0.17	0.03	0.17	0.35	0.34	0.17

a See Table 8-2 for method constituents and their reporting limits.

b nd = Not detected above reporting limits, except as listed.

Table 8-63. WDR 93-100 constituents of concern in Site 300 Pit 1 monitoring wells for 1997.

Constituent of concern	Monitoring well	Statistical limit	Quarterly sample dates			
			16-17 Jan	3-4 Apr	1-3 Jul	13-16 Oct
Arsenic (µg/L)	K1-01C	—[(a)]	12	11	12	11
	K1-07	—[(a)]	14	14	14	12
	K1-02B	16	11	10	12	11
	K1-03	18	13	11	12	11
	K1-04	14	14	10	11	10
	K1-05	27	14	13	14	13
	K1-08	18	14	14	12	12
	K1-09	18	14	13	12	11
Barium (µg/L)	K1-01C	—[(a)]	<25	<25	<25	<25
	K1-07	—[(a)]	26	<25	<25	<25
	K1-02B	25	<25	<25	<25	<25
	K1-03	25	<25	<25	<25	<25
	K1-04	25	26	26	<25	<25
	K1-05	34	35	31	31	31
	K1-08	45	<25	35	36	36
	K1-09	38	40	35	37	37
Beryllium (µg/L)	K1-01C	—[(a)]	<0.5	<0.5	<0.5	<0.5
	K1-07	—[(a)]	<0.5	<0.5	<0.5	<0.5
	K1-02B	0.5	<0.5	<0.5	<0.5	<0.5
	K1-03	0.5	<0.5	<0.5	<0.5	<0.5
	K1-04	0.5	<0.5	<0.5	<0.5	<0.5
	K1-05	0.5	<0.5	<0.5	<0.5	<0.5
	K1-08	0.5	<0.5	<0.5	<0.5	<0.5
	K1-09	0.5	<0.5	<0.5	<0.5	<0.5
Cadmium (µg/L)	K1-01C	—[(a)]	<0.5	<0.5	<0.5	<0.5
	K1-07	—[(a)]	<0.5	<0.5	<0.5	<0.5
	K1-02B	0.5	<0.5	<0.5	<0.5	<0.5
	K1-03	0.5	<0.5	<0.5	<0.5	<0.5
	K1-04	0.5	<0.5	<0.5	<0.5	<0.5
	K1-05	0.5	<0.5	<0.5	<0.5	<0.5
	K1-08	0.5	<0.5	<0.5	<0.5	<0.5
	K1-09	0.5	<0.5	<0.5	<0.5	<0.5

Table 8-63. WDR 93-100 constituents of concern in Site 300 Pit 1 monitoring wells for 1997 (continued).

Constituent of concern	Monitoring well	Statistical limit	Quarterly sample dates			
			16-17 Jan	3-4 Apr	1-3 Jul	13-16 Oct
Cobalt (µg/L)	K1-01C	—[a]	<25	<25	<25	<25
	K1-07	—[a]	<25	<25	<25	<25
	K1-02B	50	<25	<25	<25	<25
	K1-03	50	<25	<25	<25	<25
	K1-04	50	<25	<25	<25	<25
	K1-05	50	<25	<25	<25	<25
	K1-08	50	<25	<25	<25	<25
	K1-09	50	<25	<25	<25	<25
Copper (µg/L)	K1-01C	—[a]	25	18	19	29
	K1-07	—[a]	<10	<10	<10	<10
	K1-02B	70	14	11	<10	14
	K1-03	70	<10	<10	<10	<10
	K1-04	70	<10	<10	<10	<10
	K1-05	70	13	<10	<10	14
	K1-08	70	<10	<10	<10	<10
	K1-09	70	<10	<10	<10	<10
Lead (µg/L)	K1-01C	—[a]	<2	<2	<2	<2
	K1-07	—[a]	<2	<2	<2	<2
	K1-02B	6	14	<2	<2	<2
	K1-03	6	<2	<2	<2	<2
	K1-04	6	<2	4.1	<2	<2
	K1-05	6	<2	<2	<2	<2
	K1-08	6	<2	<2	<2	<2
	K1-09	6	<2	<2	<2	<2
Nickel (µg/L)	K1-01C	—[a]	<5	<5	<5	<5
	K1-07	—[a]	<5	<5	<5	<5
	K1-02B	100	<5	<5	<5	<5
	K1-03	100	<5	<5	<5	<5
	K1-04	100	<5	<5	<5	<5
	K1-05	100	<5	<5	<5	<5
	K1-08	100	<5	<5	<5	<5
	K1-09	100	<5	<5	<5	<5

Table 8-63. WDR 93-100 constituents of concern in Site 300 Pit 1 monitoring wells for 1997 (continued).

Constituent of concern	Monitoring well	Statistical limit	Quarterly sample dates			
			16-17 Jan	3-4 Apr	1-3 Jul	13-16 Oct
Vanadium (µg/L)	K1-01C	—[(a)]	73	71	68	65
	K1-07	—[(a)]	76	74	68	70
	K1-02B	103	53	51	50	48
	K1-03	103	54	51	49	50
	K1-04	103	34	44	35	36
	K1-05	103	74	65	65	67
	K1-08	103	69	62	61	63
	K1-09	103	67	55	58	55
Zinc (µg/L)	K1-01C	—[(a)]	30	26	<20	<20
	K1-07	—[(a)]	<20	<20	<20	<20
	K1-02B	91	33	28	<20	54
	K1-03	91	26	24	27	<20
	K1-04	91	<20	25	<20	<20
	K1-05	91	<20	<20	<20	<20
	K1-08	91	<20	<20	<20	<20
	K1-09	91	<20	<20	<20	<20
Radium-226 (Bq/L)	K1-01C	—[(a)]	0.007	0.001	0.011	0.013
	K1-07	—[(a)]	0.004	0.013	0.000	0.003
	K1-02B	0.046	0.002	0.008	0.004	0.003
	K1-03	0.046	–0.001	0.004	0.004	0.002
	K1-04	0.046	0.000	0.004	0.000	0.004
	K1-05	0.046	0.003	0.007	0.005	0.013
	K1-08	0.046	–0.001	0.003	0.001	0.005
	K1-09	0.046	0.000	0.004	0.000	0.003
Tritium (Bq/L)	K1-01C	—[(a)]	14.02	11.9	10.9	10.6
	K1-07	—[(a)]	-0.32	–1.15	0.20	–1.33
	K1-02B	—[(b)]	144.8	195	197	222
	K1-03	11.43	19.92	17.6	19.0	19.4
	K1-04	6.14	0.79	–1.22	–0.55	–0.156
	K1-05	6.88	–0.13	–0.55	–0.36	0.395
	K1-08	5.22	0.04	–0.17	–0.56	–0.419
	K1-09	5.51	–0.22	–0.89	0.47	–0.311

Table 8-63. WDR 93-100 constituents of concern in Site 300 Pit 1 monitoring wells for 1997 (continued).

Constituent of concern	Monitoring well	Statistical limit	Quarterly sample dates			
			16-17 Jan	3-4 Apr	1-3 Jul	13-16 Oct
Total uranium (Bq/L)	K1-01C	—[a]	0.138	0.115	0.119	0.124
	K1-07	—[a]	0.084	0.090	0.068	0.085
	K1-02B	0.130	0.094	0.120	0.119	0.126
	K1-03	0.130	0.057	0.052	0.050	0.056
	K1-04	0.130	0.055	0.078	0.057	0.063
	K1-05	0.130	0.081	0.069	0.075	0.075
	K1-08	0.130	0.087	0.090	0.093	0.106
	K1-09	0.130	0.084	0.070	0.070	0.084
Thorium-228 (Bq/L)	K1-01C	—[a]	–0.001	—[c]	–0.001	–0.001
	K1-07	—[a]	–0.001	—[c]	0.000	0.000
	K1-02B	0.039	0.000	—[c]	0.000	–0.002
	K1-03	0.039	0.001	—[c]	–0.001	–0.001
	K1-04	0.039	0.000	—[c]	0.000	–0.001
	K1-05	0.039	0.000	—[c]	–0.001	–0.001
	K1-08	0.039	–0.001	—[c]	0.000	0.001
	K1-09	0.039	0.000	—[c]	–0.001	0.001
Thorium-232 (Bq/L)	K1-01C	—[a]	0.000	0.0000013	0.000	0.000
	K1-07	—[a]	0.000	0.0000031	0.000	–0.001
	K1-02B	0.020	0.000	0.0000006	–0.001	0.000
	K1-03	0.020	0.000	0.0000032	0.000	0.000
	K1-04	0.020	0.000	0.0000005	0.000	0.001
	K1-05	0.020	0.000	0.0000012	0.000	0.000
	K1-08	0.020	0.001	0.0000013	0.000	0.000
	K1-09	0.020	0.000	0.0000001	0.000	0.000
HMX (µg/L)	K1-01C	—[a]	<5	<5	<5	<5
	K1-07	—[a]	<5	<5	<5	<5
	K1-02B	20	<5	<5	<5	<5
	K1-03	20	<5	<5	<5	<5
	K1-04	20	<5	<5	<5	<5
	K1-05	20	<5	<5	<5	<5
	K1-08	20	<5	<5	<5	<5
	K1-09	20	<5	<5	<5	<5

Table 8-63. WDR 93-100 constituents of concern in Site 300 Pit 1 monitoring wells for 1997 (concluded).

Constituent of concern	Monitoring well	Statistical limit	Quarterly sample dates			
			16-17 Jan	3-4 Apr	1-3 Jul	13-16 Oct
RDX (µg/L)	K1-01C	—[(a)]	<5	<5	<5	<5
	K1-07	—[(a)]	<5	<5	<5	<5
	K1-02B	30	<5	<5	<5	<5
	K1-03	30	<5	<5	<5	<5
	K1-04	30	<5	<5	<5	<5
	K1-05	30	<5	<5	<5	<5
	K1-08	30	<5	<5	<5	<5
	K1-09	30	<5	<5	<5	<5

[a] Upgradient well.

[b] Exempt well (insensitive to further detection of tritium releases).

[c] Quantity of thorium-228 was too small to measure by mass spectrometry.

Table 8-64. Analytical results for RCRA Post-Closure Monitoring Plan parameters and constituents of concern for Site 300 Pit 1 monitoring wells in 1997.

Constituent of concern	Q(a)	Monitoring well							
		K1-01C(b)	K1-07(b)	K1-02B	K1-03	K1-04	K1-05	K1-08	K1-09
pH (pH units)	1	7.38	7.43	7.80	7.40	7.43	7.43	7.47	7.46
	3	7.38	7.41	7.25	7.36	7.45	7.48	7.45	7.50
Specific conductance (µmho/cm)	1	500	500	600	500	600	600	700	700
	3	600	700	800	600	700	700	800	700
Water table elevation (ft)	1	979.1	971.6	975.0	973.0	968.7	961.2	971.4	968.3
	3	981.6	973.8	977.4	975.6	970.7	962.8	973.9	970.9
Water temperature (^{o}C)	1	20.8	20.9	20.7	18.7	18.0	20.4	19.1	19.5
	3	21.8	21.8	20.5	20.8	20.9	21.6	22.2	21.6
Gross alpha (Bq/L)	1	0.12	0.03	0.02	–0.03	0.02	0.10	0.04	0.10
	3	0.05	0.02	0.03	0.04	0.06	0.09	0.03	0.06
Gross beta (Bq/L)	1	0.11	0.12	0.11	0.12	0.09	0.14	0.17	0.04
	3	0.18	0.10	0.11	0.06	0.07	0.13	0.09	0.06
Chromium (µg/L)	2	<1	2.5	<1	<1	<1	1.2	1.5	<1
	4	<1	1	<1	<1	<1	<1	1.6	<1
Iron (µg/L)	2	<100	<100	<100	170	140	<100	<100	<100
	4	<100	<100	<100	<100	<100	<100	<100	<100
Manganese (µg/L)	2	<100	<100	<100	<100	<100	<100	<100	<100
	4	<100	<100	<100	<100	<100	<100	<100	<100
Mercury (µg/L)	2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium (µg/L)	2	3.4	<2	3.2	2.8	3	<2	<2	<2
	4	2.2	2.3	<2	3.8	3.8	2.5	2.7	2.7
Silver (µg/L)	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sodium (mg/L)	2	31	37	38	30	36	36	38	36
	4	28	35	37	29	33	36	37	38
Nitrate (mg/L)	2	35	25	29	25	20	30	26	29
	4	36	34	31	29	24	35	37	36
Gross alpha (Bq/L)	2	0.06	0.05	0.03	0.04	0.02	0.03	0.05	0.05
	4	0.09	-0.01	0.05	0.01	0.00	0.06	0.02	0.07
Gross beta (Bq/L)	2	0.09	0.10	0.11	0.10	0.08	0.11	0.11	0.11
	4	0.13	0.11	0.10	0.08	0.06	0.07	0.14	0.10

Table 8-64. Analytical results for RCRA Post-Closure Monitoring Plan parameters and constituents of concern for Site 300 Pit 1 monitoring wells in 1997 (concluded).

Constituent of concern	Q[(a)]	Monitoring well							
		K1-01C[(b)]	K1-07[(b)]	K1-02B	K1-03	K1-04	K1-05	K1-08	K1-09
Organic compounds									
Volatile (EPA 601)	2	nd[(c)]	nd	nd	nd	nd	nd	nd	nd
Freon 113 (µg/L)							57	99	99
Volatile (EPA 624)	4	nd	nd	nd	nd	nd	nd	nd	nd
Freon 113 (µg/L)							45	63	120
Semivolatile (EPA 625)	4	nd	nd	nd	nd	nd	nd	nd	nd
Pesticide and PCB (EPA 608)	4	nd	nd	nd	nd	nd	nd	nd	nd
Total organic carbon (TOC) (EPA 415) (mg/L)	4	<2	<2	<2	<2	<2	<2	7.8	<2
Total organic halides (TOX) (EPA 9020) (µg/L)	4	<10	<10	<10	<10	<10	20	30	40

a Sample date (quarter-year division). 1 = 1/16/97–1/17/97; 2 = 4/3/97–4/497; 3 = 7/1/97–7/3/97; 4 = 10/13/97–10/16/97.

b Upgradient well.

c Not detected above reporting limits, except as listed.

Table 8-65. WDR 93-100 constituents of concern in Site 300 Pit 7 monitoring wells.

Constituent of concern	Monitoring well	Statistical limit	Quarterly sample dates			
			22 Jan-3 Feb	8-18 Apr	17-30 Jul	21-28 Oct
Arsenic (µg/L)	K7-06	—[(a)]	17.0	17.0	15.0	14.0
	K7-01	14.0	11.0	9.1	9.0	7.8
	K7-03	6.4	<2.0	2.1	2.2	<2
	K7-09	2.0	<2.0	2.2	<2	<2
	K7-10	8.6	<2.0	3.0	2.0	<2
	NC7-25	8.9	4.4	5.4	6.3	4.3
	NC7-26	13.0	2.2	<2	2.9	2.4
	NC7-47	21.0	11.0	12.0	13.0	11.0
	NC7-48	14.0	5.0	5.8	5.9	<2
Barium (µg/L)	K7-06	—[(a)]	77	71	74	74
	K7-01	210	160	150	170	170
	K7-03	79	62	62	61	62
	K7-09	50	<25	<25	<25	<25
	K7-10	92	81	34	39	32
	NC7-25	70	71	73	74	79
	NC7-26	50	<25	26	26	25
	NC7-47	62	51	45	47	49
	NC7-48	290	110	130	120	110
Beryllium (µg/L)	K7-06	—[(a)]	<0.5	<0.5	<0.5	<0.5
	K7-01	0.5	<0.5	<0.5	<0.5	<0.5
	K7-03	0.5	<0.5	<0.5	<0.5	<0.5
	K7-09	0.5	<0.5	<0.5	<0.5	<0.5
	K7-10	0.5	<0.5	<0.5	<0.5	<0.5
	NC7-25	0.5	<0.5	<0.5	<0.5	<0.5
	NC7-26	0.5	<0.5	<0.5	<0.5	<0.5
	NC7-47	0.5	<0.5	<0.5	<0.5	<0.5
	NC7-48	0.5	<0.5	<0.5	<0.5	<0.5
Cadmium (µg/L)	K7-06	—[(a)]	<0.5	<0.5	<0.5	<0.5
	K7-01	0.5	<0.5	<0.5	<0.5	<0.5
	K7-03	0.5	<0.5	<0.5	<0.5	<0.5
	K7-09	0.5	<0.5	<0.5	<0.5	<0.5
	K7-10	1.6	<0.5	<0.5	<0.5	<0.5
	NC7-25	0.6	<0.5	<0.5	<0.5	<0.5
	NC7-26	0.5	<0.5	<0.5	<0.5	<0.5
	NC7-47	1.5	<0.5	<0.5	<0.5	<0.5
	NC7-48	1.5	<0.5	<0.5	<0.5	<0.5

Table 8-65. WDR 93-100 constituents of concern in Site 300 Pit 7 monitoring wells (continued).

Constituent of concern	Monitoring well	Statistical limit	Quarterly sample dates			
			22 Jan-3 Feb	8-18 Apr	17-30 Jul	21-28 Oct
Cobalt (µg/L)	K7-06	—[(a)]	<25	<25	<25	<25
	K7-01	25	<25	<25	<25	<25
	K7-03	25	<25	<25	<25	<25
	K7-09	25	<25	<25	<25	<25
	K7-10	25	<25	<25	<25	<25
	NC7-25	25	<25	<25	<25	<25
	NC7-26	25	<25	<25	<25	<25
	NC7-47	25	<25	<25	<25	<25
	NC7-48	25	<25	<25	<25	<25
Copper (µg/L)	K7-06	—[(a)]	<10	<10	<10	<10
	K7-01	47	10	<10	14	19
	K7-03	140	80	61	38	59
	K7-09	10	<10	<10	<10	<10
	K7-10	10	<10	<10	<10	<10
	NC7-25	10	<10	<10	<10	<10
	NC7-26	10	<10	<10	<10	<10
	NC7-47	10	<10	<10	<10	<10
	NC7-48	10	<10	<10	<10	<10
Lead (µg/L)	K7-06	—[(a)]	<2.0	<2.0	<2	<2
	K7-01	6.0	<2.0	<2.0	<2	<2
	K7-03	6.1	<2.0	<2.0	<2	<2
	K7-09	5.9	<2.0	<2.0	<2	2.3
	K7-10	2.0	<2.0	<2.0	7	<2
	NC7-25	2.0	<2.0	<2.0	<2	<2
	NC7-26	5.1	<2.0	<2.0	<2	<2
	NC7-47	7.6	6.3	<2.0	<2	<2
	NC7-48	2.0	<2.0	<2.0	<2	<2
Nickel (µg/L)	K7-06	—[(a)]	<5	<5	<5	<5
	K7-01	12	<5	<5	<5	<5
	K7-03	21	<5	<5	<5	6.1
	K7-09	5	<5	<5	<5	<5
	K7-10	37	<5	12	<5	<5
	NC7-25	23	<5	<5	<5	<5
	NC7-26	5	<5	<5	<5	<5
	NC7-47	14	<5	<5	<5	<5
	NC7-48	65	<5	<5	<5	<5

Table 8-65. WDR 93-100 constituents of concern in Site 300 Pit 7 monitoring wells (continued).

Constituent of concern	Monitoring well	Statistical limit	Quarterly sample dates			
			22 Jan-3 Feb	8-18 Apr	17-30 Jul	21-28 Oct
Vanadium (µg/L)	K7-06	—[(a)]	38	32	33	33
	K7-01	50	<25	<25	<25	<25
	K7-03	50	<25	<25	<25	<25
	K7-09	50	<25	<25	<25	<25
	K7-10	50	<25	<25	<25	<25
	NC7-25	50	<25	<25	<25	<25
	NC7-26	50	<25	<25	<25	<25
	NC7-47	77	46	57	63	61
	NC7-48	140	<25	<25	<25	21
Zinc (µg/L)	K7-06	—[(a)]	<20	<20	<20	<20
	K7-01	54	<20	23	<20	<20
	K7-03	70	46	61	29	47
	K7-09	20	<20	<20	<20	<20
	K7-10	20	<20	<20	40	<20
	NC7-25	36	<20	<20	<20	22
	NC7-26	20	<20	<20	<20	<20
	NC7-47	27	27	<20		<20
	NC7-48	71	<20	<20	<20	<20
Radium 226 (Bq/L)	K7-06	—[(a)]	0.010	0.023	0.011	0.020
	K7-01	0.097	0.022	0.030	0.034	0.032
	K7-03	0.044	0.000	0.005	0.006	0.015
	K7-09	0.022	0.006	0.005	0.001	0.005
	K7-10	0.033	0.006	0.004	0.011	0.007
	NC7-25	0.048	0.029	0.026	0.018	0.021
	NC7-26	0.034	0.006	0.013	0.017	0.020
	NC7-47	0.029	0.005	0.006	0.006	0.004
	NC7-48	1.099	0.008	0.019	0.015	0.005
Tritium (Bq/L)	K7-06	—[(a)]	0.0	–0.6	–0.24	–0.040
	K7-01	—[(b)]	1150	1316	1590	1580
	K7-03	—[(b)]	6200	5841	5770	5510
	K7-09	13.8	–0.1	–0.4	–0.85	1.74
	K7-10	13.8	0.3	–0.7	–0.73	–0.790
	NC7-25	—[(b)]	16400	16940	18250	19800
	NC7-26	—[(b)]	132	186	144	166
	NC7-47	13.8	–3.7	–0.1	0.06	–0.800
	NC7-48	13.8	7.3	13.6	6.14	4.13

Table 8-65. WDR 93-100 constituents of concern in Site 300 Pit 7 monitoring wells (continued).

Constituent of concern	Monitoring well	Statistical limit	Quarterly sample dates			
			22 Jan-3 Feb	8-18 Apr	17-30 Jul	21-28 Oct
Uranium (total, Bq/L)	K7-06	—[(a)]	0.042	0.052	0.073	0.057
	K7-01	0.592	0.437	0.450	0.543	0.586
	K7-03	0.228	0.115	0.118	0.115	0.137
	K7-09	0.042	0.000	0.004	0.007	0.009
	K7-10	0.080	0.014	0.019	0.023	0.024
	NC7-25	1.221	0.770	0.997	1.091	1.235
	NC7-26	0.032	0.010	0.023	0.028	0.024
	NC7-47	0.122	0.078	0.080	0.071	0.069
	NC7-48	2.220	0.707	1.032	0.745	0.529
Thorium 228 (Bq/L)	K7-06	—[(a)]	—[(c)]	0.001	0.000	–0.0004
	K7-01	0.032	—[(c)]	0.001	0.003	0.0001
	K7-03	0.032	—[(c)]	–0.002	–0.001	–0.0004
	K7-09	0.032	—[(c)]	0.001	–0.001	–0.0007
	K7-10	0.032	—[(c)]	–0.001	–0.002	0.0010
	NC7-25	0.032	—[(c)]	0.000	–0.001	–0.0011
	NC7-26	0.032	—[(c)]	0.001	0.000	–0.0001
	NC7-47	0.032	—[(c)]	0.000	–0.001	0.0005
	NC7-48	0.032	—[(c)]	0.000	–0.001	0.0001
Thorium 232 (Bq/L)	K7-06	—[(a)]	0.0000017	0.000	–0.001	0.0000
	K7-01	0.050	0.0000022	0.000	–0.001	–0.0002
	K7-03	0.050	0.0000038	0.000	0.000	–0.0002
	K7-09	0.050	0.0000002	–0.001	0.000	–0.0001
	K7-10	0.050	0.0001495	0.000	0.000	0.0003
	NC7-25	0.050	0.0000118	0.000	0.000	0.0005
	NC7-26	0.050	0.0000022	0.000	0.000	–0.0003
	NC7-47	0.050	0.0002812	0.000	0.000	0.0000
	NC7-48	0.050	0.0004958	0.000	0.000	–0.0005
HMX (µg/L)	K7-06	—[(a)]	<5	<5	<5	<5
	K7-01	20	<5	<5	<5	<5
	K7-03	20	<5	<5	<5	<5
	K7-09	20	<5	<5	<5	<5
	K7-10	20	<5	<5	<5	<5
	NC7-25	20	<5	<5	<5	<5
	NC7-26	20	<5	<5	<5	<5
	NC7-47	20	<5	<5	<5	<5
	NC7-48	20	<5	<5	<5	<5

Table 8-65. WDR 93-100 constituents of concern in Site 300 Pit 7 monitoring wells (concluded).

Constituent of concern	Monitoring well	Statistical limit	Quarterly sample dates			
			22 Jan-3 Feb	8-18 Apr	17-30 Jul	21-28 Oct
RDX (µg/L)	K7-06	—(a)	<5	<5	< 5	< 5
	K7-01	30	<5	<5	<5	<5
	K7-03	30	<5	<5	<5	<5
	K7-09	30	<5	<5	<5	<5
	K7-10	30	<5	<5	<5	<5
	NC7-25	30	<5	<5	<5	<5
	NC7-26	30	<5	<5	<5	<5
	NC7-47	30	<5	<5	<5	<5
	NC7-48	30	<5	<5	<5	<5

a Upgradient well.

b Exempt well (insensitive to further detection of tritium releases).

c Quantity of thorium-228 was too small to measure by mass spectrometry.

Table 8-66. Additional RCRA Post-Closure Monitoring Plan parameters and constituents of concern for Site 300 Pit 7 monitoring wells.

Constituent of concern	Monitoring well	Quarterly sample dates			
		22-28 Jan	8-16 Apr	17-30 Jul	21-28 Oct
Ground water elevation (ft)	K7-06[(a)]	1392.1	1390.8	1390.0	1389.7
	K7-01	1298.0	1300.9	1298.1	1298.1
	K7-03	1317.7	1317.7	1317.3	1315.9
	K7-09	1300.9	1301.7	1301.6	1301.0
	K7-10	1312.4	1310.2	1309.6	1309.4
	NC7-25	1301.3	1302.0	1301.4	1301.4
	NC7-26	1259.5	1260.3	1259.8	1259.6
	NC7-47	1205.4	1204.4	1205.6	1205.6
	NC7-48	1352.9	1350.3	1348.3	1348.3
VOCs (EPA Method 601)	nd[(b)]	nd	nd	nd	nd
TCE (µg/L)	K7-01	1.9	1.5	2.0	2.3
TCE (µg/L)	K7-03	2.1	1.2	0.9	1.3
1,1-DCE (µg/L)	K7-03	<0.5	<0.5	<0.5	0.5
Freon 11 (µg/L)	NC7-48	1.0	2.0	1.4	0.9
Gross alpha (Bq/L)	K7-06[(a)]	0.07	0.01	0.03	0.04
	K7-01	0.41	0.37	0.34	0.28
	K7-03	0.20	0.04	0.08	0.12
	K7-09	0.01	0.00	–0.02	–0.03
	K7-10	–0.02	0.08	–0.03	–0.04
	NC7-25	1.20	0.34	0.95	1.22
	NC7-26	0.06	0.06	0.04	0.12
	NC7-47	0.05	0.02	–0.02	0.02
	NC7-48	1.00	0.81	0.27	0.44
Gross beta (Bq/L)	K7-06[(a)]	0.16	0.13	0.11	0.11
	K7-01	0.25	0.53	0.27	0.46
	K7-03	0.17	0.13	0.14	0.19
	K7-09	1.76	2.01	1.48	0.85
	K7-10	0.40	0.26	0.34	0.07
	NC7-25	0.26	0.32	0.52	0.19
	NC7-26	0.13	0.17	0.11	0.18
	NC7-47	0.11	0.15	0.09	0.12
	NC7-48	0.36	0.36	0.21	0.13

a Upgradient well.

b VOCs were not detected above reporting limits for monitoring wells not listed.

Table 8-67. Analysis of Site 300 Explosives Process Area wastewater.

Location	Buildings 806/807(a)			Building 809(b)			WDR
Parameter	MDL(c)	Result	Reporting limit	MDL(dc)	Result	Reporting limit	effluent limits(d)
Metals (mg/L)							
Aluminum	0.02	0.12	0.05	0.02	0.21	0.05	NA(e)
Arsenic	0.00068	0.00185 est(f)	0.002	0.00068	0.0015 est	0.002	5
Barium	0.0019	0.0251 est	0.1	0.0019	0.028 est	0.1	100
Cadmium	0.000046	0.000428 est	0.001	0.000046	0.0026	0.001	1
Chromium	0.00003	0.00063 est	0.001	0.00003	0.072	0.001	5
Cobalt	0.0027	<0.050	0.05	0.0027	0.0033 est	0.05	80
Copper	0.00008	0.0089	0.001	0.00008	0.058	0.001	25
Lead	0.00033	0.00314 est	0.005	0.00033	0.01	0.005	5
Manganese	0.0011	0.0096 est	0.01	0.0011	0.02	0.01	NA
Molybdenum	0.0037	0.0356 est	0.05	0.0037	0.018 est	0.05	350
Nickel	0.00055	0.00125 est	0.01	0.00055	0.037	0.01	20
Silver	0.0002	<0.001	0.001	0.0002	0.025	0.001	5
Zinc	0.002	0.062	0.05	0.002	0.26	0.05	250
Energetic materials (mg/L)							
PETN	0.00052	<0.001	0.001	0.00052	<0.001	0.001	NA
RDX	0.0002	0.0015	0.00085	0.0002	0.00079	0.00085	NA
HMX	0.00008	0.087	0.001	0.00008	NQ(g)	0.001	NA
TATB	0.05	<0.050	0.05	0.005	<0.020	0.02	NA
TNT	0.00003	0.00028	0.00026	0.00003	<0.00026	0.00026	NA
Semivolatile organic compounds (µg/L)							
Bis(2-ethylhexyl)phthalate	0.673	2200	30	0.673	110	5	1,000,000
Diethyl phthalate	0.437	<2	2	0.437	5.7	2	1,000,000
o-Cresol	0.414	<10	10	0.414	<2	2	50,000
p-Cresol	0.379	<10	10	0.379	<2	2	50,000
Naphthalene	0.394	<10	10	0.394	<2	2	200,000
Volatile organic compounds (µg/L)							
Methylene chloride	0.3	<1	1	0.3	1.4	1	1,000,000

a Sampling date, 9/10/97.

b Sampling date, 9/17/97.

c MDL = Method detection limit.

d These discharge limits are found in the Monitoring and Reporting Program No. 96-248 accompanying WDR No. 96-248, adopted on 9/20/96, or in Appendix C of the Amended Report of Waste Discharge (1995).

e NA = Not applicable.

f Results followed by "est" have estimated values between the MDL and the reporting limit for that compound.

g NQ = Analyte detected but not quantified.

Table 8-68. First quarter[(a)] analytical results for WDR 96-248 constituents of concern in Site 300 ground water beneath surface impoundments.

Parameter		MDL[(b)]	RL[(c)]	Location				Statistical limit[(d)]
				W-817-01	W-817-02	W-817-03	W-817-04	
General								
pH (pH units)		NAFL[(e)]	0.1	8.26	8.13	8.21	8.18	none
Halocarbons (µg/L)								
1,1,1-Trichloroethane		0.06	0.5	<0.5	<0.5	<0.5	<0.5	1
Bromoform		0.24	0.5	<0.5	<0.5	0.34 est[(f)]	<0.5	1
1,2-Dichloroethane (1,2-DCA)		0.2	0.5	<0.5	<0.5	<0.5	<0.5	1
Freon 113		0.1	0.5	<0.5	<0.5	<0.5	<0.5	1
Methylene chloride[(g)]		0.3	1	<1	<1	<1	<1	1
Tetrachloroethene (PCE)		0.09	0.5	<0.5	<0.5	<0.5	<0.5	1
Chlorobenzene		0.11	0.5	<0.5	<0.5	<0.5	<0.5	1
Hydrocarbons (µg/L)								
Toluene		0.06	0.5	<0.5	<0.5	<0.5	<0.5	1
Naphthalene		0.394	2	<2	<2	<2	<2	5
Dimethyl sulfoxide (DMSO)		4	10	<10	<10	<10	<10	10
Photographic chemicals (µg/L)								
o-Cresol		0.414	2	<2	<2	<2	<2	5
p-Cresol		0.379	2	<2	<2	<2	<2	5
Volatile/semivolatile compounds (µg/L)								
Acetone[(g)]		2	10	<10	<10.	<10	<10	40
2-Butanone (MEK)		4	20	<20	<20	<20	<20	40
Additives to energetic compounds (µg/L)								
Di-*n*-octylphthalate		0.635	2	<2	<2	<2	<2	2
Unreactive polymers (µg/L)								
Styrene		0.1	0.5	<0.5	<0.5	<0.5	<0.5	1
Vinyl chloride		0.2	0.5	<0.5	<0.5	<0.5	<0.5	1
Metals (mg/L)								
Aluminum		0.0064	0.05	<0.05	<0.05	<0.05	<0.05	0.2
		0.0064	0.05	<0.05	<0.05	<0.05	<0.05	0.2
Arsenic	Sampled on 1/6–7/97	0.00068	0.002	0.041	0.049	0.049	0.053	ANOVA[(h)]
	Sampled on 1/13/97	0.00068	0.002	0.042	0.047	0.048	0.053	ANOVA
	Sampled on 1/21/97	0.00068	0.002	0.045	0.051	0.051	0.055	ANOVA
	Sampled on 1/27/97	0.00068	0.002	0.044	0.048	0.049	0.054	ANOVA
Barium		0.002	0.025	<0.025	<0.025	<0.025	0.0071 est	0.05
Cadmium		0.00005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0042
Chromium		0.00025	0.001	<0.001	0.0011	0.002	0.0045	0.0098

Table 8-68. First quarter[a] analytical results for WDR 96-248 constituents of concern in Site 300 ground water beneath surface impoundments (continued).

Parameter		MDL[b]	RL[c]	Location				Statistical limit[d]
				W-817-01	W-817-02	W-817-03	W-817-04	
Cobalt		0.0037	0.05	<0.05	<0.05	<0.05	<0.05	0.05
Copper		0.0073	0.01	<0.01	0.09	<0.01	<0.01	0.099
		0.00008	0.001	0.0019	0.0021	<0.001	0.00096 est	0.099
Lead		0.00035	0.005	<0.005	<0.005	<0.005	<0.005	0.0067
Manganese		0.0011	0.01	<0.01	<0.01	<0.01	0.0015 est	0.042
		0.0011	0.01	<0.01	<0.01	<0.01	<0.01	0.042
Molybdenum		0.0046	0.025	0.026	0.042	0.037	0.039	0.093
Nickel		0.0081	0.05	<0.05	<0.05	<0.05	0.0246 est	0.044
		0.00055	0.002	<0.002	<0.002	<0.002	0.027	0.044
Potassium		0.04	0.1	12				none
		0.04	0.1		14.7			16.2
		0.04	0.1			11.1		14.1
		0.04	0.1				11.3	13.1
Silver		0.00021	0.001	<0.001	<0.001	<0.001	<0.001	0.0083
Zinc	Sampled on 1/6 and 7/97	0.004	0.01	0.01	0.13	0.0087 est	0.01	0.076
	Sampled on 1/6 and 7/97	0.004	0.02	<0.02	0.115	<0.02	0.0076 est	0.076
	Sampled on 1/21/97	0.004	0.02		0.14			0.076
	Sampled on 1/27/97	0.004	0.02		0.12			0.076
Salts (mg/L)								
Ammonia nitrogen (as N)		0.01	0.02	<0.02	<0.02	<0.02	<0.02	TBD[i]
	Resampled on 3/3/97	0.01	0.02	<0.02	<0.02	<0.02	<0.02	TBD
Bicarbonate alkalinity (as $CaCO_3$)		1.0	1.0	232	235	220	243	277
Bromide		0.03	0.05	0.4	0.82	0.58	0.6	TBD
	Resampled on 3/3/97	0.02	0.05	0.4[j]	0.73[j]	0.58[j]	0.63[j]	TBD
Chloride		0.5	1.0	162				none
		0.5	1.0		300			356
		0.5	1.0			222		271
	Resampled on 2/10/97	0.5	1.0			224		
		0.5	1.0				220	283
Nitrate (as NO_3)		0.2	0.4	88.6				none
		0.2	0.4		93.0			107
		0.2	0.4			93		107
		0.2	0.4				93.0	107
Orthophosphate		0.05	0.05	0.11	0.1	0.08	0.08	TBD
	Resampled on 3/3/97	0.03	0.05	0.1	0.09	0.07	0.06	TBD

Table 8-68. First quarter[a] analytical results for WDR 96-248 constituents of in Site 300 ground water beneath surface impoundments (concluded).

Parameter	MDL[b]	RL[c]	Location				Statistical limit[d]
			W-817-01	W-817-02	W-817-03	W-817-04	
Salts (mg/L) (continued)							
Sulfate	0.5	1.0	127				none
	0.5	1.0		388			442
	0.5	1.0			196		233
	0.5	1.0				208	275
Energetic materials (µg/L)							
HMX	0.16	1.0	17	<1.0	<1.0	<1.0	5
RDX	0.19	0.85	54	<0.85	6.2	5.2	9.1
TNT	0.14	0.26	<0.26	<0.26	<0.26	<0.26	5
TATB	50.0	50	<50	<50	<50	<50	TBD
Resampled on 3/3/97	5	20	<20	<20	<20	<20	TBD
Pentaerythritol tetranitrate (PETN)	0.52	1.0	<1.0	<1.0	<1.0	<1.0	1.3

a Date(s) sampled: 1/6/97, 1/7/97, 1/13/97, 1/21/97, 1/27/97 and dates resampled: 2/10/97 and 3/3/97.

b MDL = Method detection limit.

c RL = Reporting limit = Practical quantitation limit (PQL) for BC and for LAS, Inc. Analyses for energetic materials were performed by LAS, Inc.; all other analyses were performed by BC Laboratories, Inc.

d Statistical limit as listed in MRP 96-248.

e NAFL = Not available from analytical laboratory.

f Sample values followed by an "est" have values between the method detection limit and the reporting limit for that compound.

g Although acetone and methylene chloride were also detected in the field blank sampled on 1/6/97 and 1/7/97, these compounds were not detected in the monitor wells.

h ANOVA = Analysis of variance statistical method.

I TBD = Statistical methods and statistical limits are to be determined by future monitoring results.

j Bromide was detected at 0.03 mg/L in field blank sampled on 3/3/97.

Table 8-69. Second quarter[a] analytical results for WDR 96-248 constituents of concern in Site 300 ground water beneath surface impoundments.

Parameter	MDL[b]	RL[c]	Location				Statistical limit[d]
			W-817-01	W-817-02	W-817-03	W-817-04	
General							
pH (pH units)	NAFL[e]	0.1	8.16	7.98	8.1	8.08	none
Halocarbons (µg/L)							
1,1,1-Trichloroethane	0.06	0.5	<0.5	<0.5	<0.5	<0.5	1
Bromoform	0.24	0.5	<0.5	<0.5	<0.5	<0.5	1
1,2-Dichloroethane (1,2-DCA)	0.2	0.5	<0.5	<0.5	<0.5	<0.5	1
Freon 113	0.1	0.5	<0.5	<0.5	<0.5	<0.5	1
Methylene chloride[g]	0.3	1	<1	<1	<1	<1	1
Tetrachloroethene (PCE)	0.09	0.5	<0.5	<0.5	<0.5	<0.5	1
Chlorobenzene	0.11	0.5	<0.5	<0.5	<0.5	<0.5	1
Hydrocarbons (µg/L)							
Toluene	0.06	0.5	<0.5	<0.5	<0.5	<0.5	1
Naphthalene	0.394	2.0	<2	<2	<2	<2	5
Dimethyl sulfoxide (DMSO)	5	10.0	<10	<10	<10	<10	10
Photographic chemicals (µg/L)							
o-Cresol	0.414	2.0	<2	<2	<2	<2	5
p-Cresol	0.379	4.0	<4	<4	<4	<4	5
Volatile/semivolatile compounds (µg/L)							
Acetone[g]	2	10.0	<10	<10.	<10	<10	40
2-Butanone (MEK)	4	20.0	<20	<20	<20	<20	40
Additives to energetic compounds (µg/L)							
Di-*n*-octylphthalate	0.635	2.0	<2	<2	<2	<2	2
Unreactive polymers (µg/L)							
Styrene	0.1	0.5	<0.5	<0.5	<0.5	<0.5	1
Vinyl chloride	0.2	0.5	<0.5	<0.5	<0.5	<0.5	1
Metals (mg/L)							
Aluminum	0.048	0.05	<0.05	<0.05	<0.05	<0.05	0.2
	0.048	0.05	<0.05	<0.05	<0.05	<0.05	0.2
Arsenic	0.00068	0.002	0.034	0.037	0.037	0.041	ANOVA[f]
	0.00068	0.005	0.048	0.052	0.051	0.055	ANOVA
	0.00068	0.005	0.045	0.049	0.049	0.053	ANOVA
	0.00068	0.01	0.047	0.055	0.054	0.055	ANOVA
Barium	0.0026	0.025	0.014 est[g]	0.011 est	0.009 est	0.008 est	0.05
Cadmium	0.00005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0042
Chromium	0.00003	0.001	0.0016	0.0012	0.0023	<0.001	0.0098

Table 8-69. Second quarter[a] analytical results for WDR 96-248 constituents of concern in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL[b]	RL[c]	Location				Statistical limit[d]
			W-817-01	W-817-02	W-817-03	W-817-04	
Cobalt	0.0043	0.05	<0.05	<0.05	<0.05	<0.05	0.05
Copper	0.0064	0.01	0.016	<0.01	0.033	<0.01	0.099
	0.00008	0.001	0.0072	0.0046	0.0058	0.0017	0.099
Lead	0.00035	0.005	<0.005	<0.005	<0.005	<0.005	0.0067
Manganese	0.0011	0.01	0.002 est	<0.01	<0.01	0.001 est	0.042
	0.0011	0.01	<0.01	<0.01	<0.01	0.001 est	0.042
Molybdenum	0.0039	0.025	0.027	0.043	0.037	0.042	0.093
Nickel	0.0044	0.05	<0.05	<0.05	<0.05	0.019 est	0.044
	0.00055	0.002	<0.002	<0.002	<0.002	0.02	0.044
Potassium	0.04	0.1	10.8				none
				14			16.2
					10.4		14.1
						11	13.1
Silver	0.00021	0.001	<0.001	<0.001	<0.001	<0.001	0.0083
Zinc	0.0033	0.01	0.029	0.105	0.004 est	0.016	0.076
	0.0033	0.02	0.009 est	0.115	<0.02	0.007 est	0.076
Salts (mg/L)							
Ammonia nitrogen (as N)	0.01	0.02	<0.02	<0.02	<0.02	<0.02	TBD[h]
Bicarbonate alkalinity (as $CaCO_3$)	1.0	1.0	232	238	252	258	277
Bromide	0.02	0.05	0.4	0.65	0.53	0.5	TBD
Chloride	0.5	0.5	158				none
				302			356
					217		271
						224	283
Nitrate (as NO_3)	0.2	0.4	84.1				none
				88.5			107
					88.5		107
						93	107
Orthophosphate	0.02	0.05	0.08	0.07		0.05	TBD
Resampled on 3/3/97	0.03	0.05			0.05		TBD
Sulfate	0.5	1.0	127				none
				386			442
					191		233
						211	275

Table 8-69. Second quarter[(a)] analytical results for WDR 96-248 constituents of concern in Site 300 ground water beneath surface impoundments (concluded).

Parameter	MDL[(b)]	RL[(c)]	Location				Statistical limit[(d)]
			W-817-01	W-817-02	W-817-03	W-817-04	
Energetic materials (µg/L)							
HMX	0.16	1.0	13	<1	<1	<1	5
RDX	0.19	0.85	59	<0.85	6.3	4.8	9.1
TATB	50	50	<50	<50	<50	<50	TBD
TNT	0.14	0.26	<0.26	<0.26	<0.26	<0.26	5
Pentaerythritol tetranitrate (PETN)	0.52	1.0	<1	<1	<1	<1	1.3

a Date(s) sampled: 4/1/97–4/21/97.

b MDL = Method detection limit.

c RL = Reporting limit = Practical quantitation limit (PQL) for analytical laboratories.

d Statistical limit as listed in MRP 96-248.

e NAFL = Not available from analytical laboratory.

f ANOVA = Analysis of variance statistical method.

g Sample values followed by an “est” have values between the method detection limit and the reporting limit for that compound.

h TBD = Statistical methods and statistical limits are to be determined by future monitoring results.

Table 8-70. Third quarter(a) analytical results for WDR 96-248 constituents of concern in Site 300 ground water beneath surface impoundments.

Parameter		MDL(b)	RL(c)	Location				Statistical limit(d)
				W-817-01	W-817-02	W-817-03	W-817-04	
General								
pH (pH units)		NAFL(e)	0	8.09	7.91	8.05	7.94	none
Halocarbons (µg/L)								
1,1,1-Trichloroethane		0.06	0.5	<0.5	<0.5	<0.5	<0.5	1
Bromoform		0.24	0.5	<0.5	<0.5	<0.5	<0.5	1
1,2-Dichloroethane (1,2-DCA)		0.2	0.5	<0.5	<0.5	<0.5	<0.5	1
Freon 113		0.1	0.5	<0.5	<0.5	<0.5	<0.5	1
Methylene chloride		0.3	1	<1	<1	<1	<1	1
Tetrachloroethene (PCE)		0.09	0.5	<0.5	<0.5	<0.5	<0.5	1
Chlorobenzene		0.11	0.5	<0.5	<0.5	<0.5	<0.5	1
Hydrocarbons (µg/L)								
Toluene		0.06	0.5	<0.5	<0.5	<0.5	<0.5	1
Naphthalene		0.394	2	<2	<2	<2	<2	5
Dimethyl sulfoxide (DMSO)		5	10	<10	<10	<10	<10	10
Photographic chemicals (µg/L)								
o-Cresol		0.414	2	<2	<2	<2	<2	5
p-Cresol		0.379	2	<2	<2	<2	<2	5
Volatile/semivolatile compounds (µg/L)								
Acetone		5	10	<10	<10.	<10	<10	40
2-Butanone (MEK)		10	20	<20	<20	<20	<20	40
Additives to energetic compounds (µg/L)								
Di-*n*-octylphthalate		0.635	2	<2	<2	<2	<2	2
Unreactive polymers (µg/L)								
Styrene		0.25	0.5	<0.5	<0.5	<0.5	<0.5	1
Vinyl chloride		0.2	0.5	<0.5	<0.5	<0.5	<0.5	1
Metals (mg/L)								
Aluminum		0.02	0.05	<0.05	<0.05	<0.05	<0.05	0.2
		0.03	0.05	<0.05	<0.05	<0.05	<0.05	0.2
Arsenic	Sampled on 7/7/97	0.00068	0.002	0.041	0.05	0.049	0.052	ANOVA(f)
	Sampled on 7/15/97	0.00068	0.002	0.044	0.058	0.055	0.061	ANOVA
	Sampled on 7/21/97	0.00068	0.002	0.044	0.05	0.048	0.054	ANOVA
	Sampled on 7/29/97	0.00068	0.002	0.044	0.052	0.052	0.055	ANOVA
Barium		0.0019	0.1	0.014 est(g)	0.01 est	0.009 est	0.007 est	0.05
Cadmium		0.00005	0.001	<0.001	0.00012 est	<0.001	<0.001	0.0042
Chromium		0.00004	0.001	0.0016	0.0011	0.0023	0.0047	0.0098

Table 8-70. Third quarter[a] analytical results for WDR 96-248 constituents of concern in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL[b]	RL[c]	Location				Statistical limit[d]
			W-817-01	W-817-02	W-817-03	W-817-04	
Cobalt	0.0027	0.05	<0.05	<0.05	<0.05	<0.05	0.05
Copper	0.004	0.01	0.007 est	<0.01	<0.01	<0.01	0.099
	0.00008	0.001	0.0061	0.0014	0.00074 est	0.00053 est	0.099
Lead	0.00035	0.005	<0.005	<0.005	<0.005	<0.005	0.0067
Manganese	0.0011	0.01	<0.01	<0.01	<0.01	<0.01	0.042
	0.0011	0.01	<0.01	<0.01	<0.01	<0.01	0.042
Molybdenum	0.0037	0.05	0.033 est	0.05	0.044 est	0.048 est	0.093
Nickel	0.0031	0.05	0.006 est	<0.05	<0.05	0.05	0.044
	0.00055	0.01	0.006 est	0.00099 est	<0.01	0.04	0.044
	0.00055	0.01				0.028	0.044
Potassium	0.04	0.2	10.4				none
	0.04	0.2		14.7			16.2
	0.04	0.2			11		14.1
	0.04	0.2				11.2	13.1
Silver	0.00021	0.002	<0.002	<0.002	<0.002	<0.002	0.0083
Zinc	0.002	0.01	0.014	0.14	0.008 est	0.006 est	0.076
	0.002	0.01	0.012	0.133	0.005 est	0.005 est	0.076
Salts (mg/L)							
Ammonia nitrogen (as N)	0.01	0.02	<0.02	<0.02	<0.02	<0.02	TBD[h]
Resampled on 3/3/97	0.01	0.02	<0.02	<0.02	<0.02	<0.02	TBD
Bicarbonate alkalinity (as $CaCO_3$)	2.6	1.0	254	238	254	260	277
Bromide	0.025	0.05	0.5	0.96	0.7	0.8	TBD
	0.025	0.05	0.56	1	0.68	0.78	TBD
Chloride	0.5	0.5	164				none
	0.5	2.0		302			356
	0.5	2.0			218		271
	0.5	2.0				232	283
Nitrate (as NO_3)	0.2	2.0	83.7				none
	0.2	2.0		88.5			107
	0.2	2.0			88.5		107
	0.2	2.0				83.7	107
Orthophosphate	0.02	0.05	0.11	0.1	0.08	0.1	TBD
	0.02	0.05	0.1	0.08	0.07	0.08	TBD

Table 8-70. Third quarter[(a)] analytical results for WDR 96-248 constituents of concern in Site 300 ground water beneath surface impoundments (concluded).

Parameters	MDL[(b)]	RL[(c)]	Location				Statistical limit[(d)]
			W-817-01	W-817-02	W-817-03	W-817-04	
Salts (mg/L) (continued)							
Sulfate	0.5	1.0	130				none
	0.5	2.0		396			442
	0.5	2.0			190		233
	0.5	2.0				222	275
Energetic materials (µg/L)							
HMX	0.08	1.0	24[(i)]	<1.0	0.25 est	<1.0	5
RDX	0.2	0.85	86	0.56 est	7.1	2.6	9.1
TATB	10.0	20	<20	<20	<20	<20	TBD
TNT	0.03	0.26	<0.26	<0.26	0.7	<0.26	5
Pentaerythritol tetranitrate (PETN)	0.52	1.0	<1.0[(j)]	<1.0[(j)]	<1.0[(j)]	<1.0[(j)]	1.3

a Date(s) sampled: 7/7/97–7/29/97.

b MDL = Method detection limit.

c RL = Reporting limit = Practical quantitation limit (PQL) for BC and for LAS, Inc. Analyses for energetic materials were performed by LAS, Inc.; all other analyses were performed by BC Laboratories, Inc.

d Statistical limit as listed in MRP 96-248.

e NAFL = Not available from analytical laboratory.

f ANOVA = Analysis of variance statistical method.

g Sample values followed by an “est” have values between the method detection limit and the reporting limit for that compound.

h TBD = Statistical methods and statistical limits are to be determined by future monitoring results.

i Concentration exceeded the calibration range.

j Analysis performed after the maximum holding requirement.

Table 8-71. Fourth quarter[a] analytical results for WDR 96-248 constituents of concern in Site 300 ground water beneath surface impoundments.

Parameter		MDL[b]	RL[c]	Location				Statistical limits[d]
				W-817-01	W-817-02	W-817-03	W-817-04	
General								
pH (pH units)		NAFL[e]	NAFL	8.26	8.09	8.09	8.25	none
Halocarbons (µg/L)								
1,1,1-Trichloroethane		0.06	0.5	<0.5	<0.5	<0.5	<0.5	1
Bromoform		0.24	0.5	<0.5	<0.5	<0.5	<0.5	1
1,2-Dichloroethane (1,2-DCA)		0.2	0.5	<0.5	<0.5	<0.5	<0.5	1
Freon 113		0.1	0.5	<0.5	<0.5	<0.5	<0.5	1
Methylene chloride[g]		0.3	1	0.31 est[f]	0.37 est	<1	<1	1
Tetrachloroethene (PCE)		0.09	0.5	<0.5	<0.5	<0.5	<0.5	1
Chlorobenzene		0.11	0.5	<0.5	<0.5	<0.5	<0.5	1
Hydrocarbons (µg/L)								
Toluene		0.06	0.5	<0.5	<0.5	<0.5	<0.5	1
Naphthalene		0.394	2	<2	<2	<2	<2	5
Dimethyl sulfoxide (DMSO)		4	10	<10	<10[g]	<10[g]	<10[g]	10
Photographic chemicals (µg/L)								
o-Cresol		0.414	2	<2	<2	<2	<2	5
p-Cresol		0.379	2	<2	<2	<2	<2	5
Volatile/semivolatile compounds (µg/L)								
Acetone		4.8	10	<10	<10.	<10	<10	40
2-Butanone (MEK)		2.3	20	<20	<20	<20	<20	40
Additives to energetic compounds (µg/L)								
Di-*n*-octylphthalate		0.635	2	<2	<2	<2	<2	2
Unreactive polymers (µg/L)								
Styrene		0.13	0.5	<0.5	<0.5	<0.5	<0.5	1
Vinyl chloride		0.2	0.5	<0.5	<0.5	<0.5	<0.5	1
Metals (mg/L)								
Aluminum		0.02	0.05	<0.05	<0.05	<0.05	<0.05	0.2
		0.02	0.05	<0.05	<0.05	<0.05	<0.05	0.2
Arsenic	Sampled on 10/17/97	0.00068	0.01	0.049		0.051		ANOVA[h]
	Sampled on 10/23/97	0.00068	0.005	0.048	0.054	0.05	0.043	ANOVA
	Sampled on 10/28/97	0.00068	0.005	0.043		0.049		ANOVA
	Sampled on 10/6/97	0.00068	0.002	0.053				ANOVA
	Sampled on 10/6/97– 0/10/97	0.00068	0.01		0.054	0.049	0.056	ANOVA
Barium		0.0019	0.025	0.013 est	0.012 est	0.01 est	0.008 est	0.05
Cadmium		0.00005	0.0005	0.00024 est	0.00035 est	<0.0005	0.00072	0.0042

Table 8-71. Fourth quarter[a] analytical results for WDR 96-248 constituents of concern in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL[b]	RL[c]	Location W-817-01	W-817-02	W-817-03	W-817-04	Statistical limits[d]
Chromium	0.00003	0.001		0.0008 est	0.0023	0.0086	0.0098
	0.000031	0.001	0.0013				
Cobalt	0.0027	0.05	<0.05	<0.05	<0.05	<0.05	0.05
Copper	0.004	0.01	<0.01	<0.01	<0.01	<0.01	0.099
	0.00008	0.001		0.0026	0.00077 est	0.0026	
	0.00012	0.001	0.0054				
Lead	0.00035	0.005	<0.005	<0.005	<0.005	<0.005	0.0067
Manganese	0.0011	0.01	<0.01	<0.01	<0.01	<0.01	0.042
	0.0011	0.01	<0.01	<0.01	<0.01	0.003 est	
Molybdenum	0.0037	0.025	0.031	0.05	0.046	0.047	0.093
Nickel	0.0031	0.05	<0.05	<0.05	<0.05	<0.05	0.044
	0.00055	0.002	0.0092	0.0015 est	0.00083 est		
	0.00055	0.01				0.034	
Potassium	0.099	1	11	14	11	11	13.1–16.2
Silver	0.00021	0.001	<0.001	<0.001	<0.001	<0.001	0.0083
Zinc	0.002	0.01	0.014	0.12	<0.01	<0.01	0.076
	0.002	0.02	0.007 est	0.129	0.004 est	0.048	
Salts (mg/L)							
Ammonia nitrogen (as N)	0.01	0.02	0.02	<0.02	<0.02	<0.02	TBD[i]
Bicarbonate alkalinity (as $CaCO_3$)	1.0	1.0	232	237	251		277
	1.0	1.0				249	
Bromide	0.025	0.05		1.1	0.75	0.52	TBD
	0.025	0.1	0.5				
Chloride	0.5	0.5	165		220	231	271–356
	0.5	1.0		306			
Nitrate (as NO_3)	0.2	2.2	53	75	75	66	107
Orthophosphate	0.02	0.05	0.11	0.09	0.07	0.1	TBD
Sulfate	0.5	1.0	127		194	218	233–442
	0.5	2.0		376			

Table 8-71. Fourth quarter[a] analytical results for WDR 96-248 constituents of concern in Site 300 ground water beneath surface impoundments (concluded).

Parameter	MDL[b]	RL[c]	Location				Statistical limits[d]
			W-817-01	W-817-02	W-817-03	W-817-04	
Energetic materials (µg/L)							
HMX	1	0.08	20	<1.0	<1.0	<1.0	5
RDX	0.85	0.2	63	<0.85	7.1	2.9	9.1
TATB	0.02	0.005	<0.02	<0.02	<0.02	<0.02	TBD
TNT	0.26	0.03	<0.26	<0.26	<0.26	<0.26	5
Pentaerythritol tetranitrate (PETN)	1.0	0.52	<1.0	<1.0	<1.0	<1.0	1.3

a Date(s) sampled: 10/6/97–10/28/97.

b MDL = Method detection limit.

c RL = Reporting limit = Practical quantitation limit (PQL) for the analytical laboratories.

d Statistical limits as listed in MRP 96-248.

e NAFL = Not available from analytical laboratory.

f Sample values followed by an “est” have values between the method detection limit and the reporting limit for that compound.

g Value reported as a tentatively identified compound.

h ANOVA = Analysis of variance statistical method.

I TBD = Statistical methods and statistical limits are to be determined by future monitoring results.

Table 8-72. First quarter[a] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments.

Parameter	MDL[b]	RL[c]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
General						
Ground water elevation (m above MSL)	NA[d]	0.003	638.01	591.46	575.71	610.24
	NA	0.003	638.46	592.01	576.16	610.49
	NA	0.003	638.36	591.74	576.06	610.49
	NA	0.003	638.06	591.41	575.91	610.24
pH (pH units)	NA	0.1	8.26	8.13	8.21	8.18
Field pH (pH units)	NA	NA	8.32	7.67	8.32	7.94
	NA	NA	7.78	8.08	8.32	8.32
	NA	NA	7.9	7.62	8.32	8.41
	NA	NA	7.83	7.57	7.72	7.68
Specific conductance (µmho/cm)	1.0	1.0	1410	2280	1730	1790
Field specific conductance (µmho/cm)			1400	2200	1800	1800
	NA	NA	1400	2300	1700	1800
	NA	NA	1500	2100	1800	1800
	NA	NA	1400	2300	1800	1800
Total dissolved solids (mg/L)	5	10.0	885	1410	1090	1130
Water temperature (°C)	NA	NA	23.1	19.6	19.8	20.8
	NA	NA	22	20.6	16.7	18.1
	NA	NA	21.6	19.4	20.3	17.2
	NA	NA	23	20.5	20	21.8
Nitrite (as N) (mg/L)	0.01	0.1	<0.1	<0.1	<0.1	<0.1
Nitrate (as N) (mg/L)	0.05	0.1	20	21	21	21
Total Kjeldahl nitrogen (mg/L)	0.2	0.2	<0.2	<0.2	<0.2	<0.2
Total phosphorus (as P) (mg/L)	0.03	0.05	0.08	0.08	0.05	0.05
Metals and minerals (mg/L)						
Antimony	0.00063	0.004	<0.004	<0.004	<0.004	0.0016 est[e]
Carbonate alkalinity (as $CaCO_3$)	1.0	1.0	17	<1	28.5	<1
Hydroxide alkalinity (as $CaCO_3$)	0.8	1	<1	<1	<1	<1
Total alkalinity (as $CaCO_3$)	1.0	1.0	249	235	248	243
Beryllium	0.00008	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Boron	0.0045	0.05	1.8	2.6	2.5	2.7
Calcium	0.03	0.1	15.4	40	19.8	19
Fluoride	0.01	0.05	1	0.8	1.2	1.2
Total hardness (as $CaCO_3$)	1.0	1.0	67.3	186	91.4	85.7

Table 8-72. First quarter[(a)] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL[(b)]	RL[(c)]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
Metals and minerals (mg/L) (cont'd)						
Chromium(VI)	0.005	0.002	0.003	0.003	0.004	0.004
Iron	0.017	0.05	<0.05	<0.05	<0.05	<0.05
Magnesium	0.002	0.01	7	21	10.2	9.3
Mercury	0.0001	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Selenium	0.0005	0.002	0.032	0.056	0.024	0.022
Sodium	0.04	0.1	280	460	346	360
Surfactants	0.02	0.05	0.13	0.13	0.14	0.14
Thallium	0.00026	0.001	<0.001	<0.001	<0.001	0.00053 est
Vanadium	0.0054	0.01	0.14	0.15	0.14	0.14
Nitrite (as NO_2)	0.03	0.2	<0.2	<0.2	<0.2	<0.2
EPA Method 624 (µg/L)						
1,1,2,2-Tetrachloroethane	0.21	0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.36	0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.13	0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	0.12	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.11	0.5	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethene	0.1	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.12	0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.09	0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.12	0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.17	0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	0.27	0.5	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethene	0.1	0.5	<0.5	<0.5	<0.5	<0.5
Benzene	0.14	0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.18	0.5	<0.5	<0.5	0.38 est	<0.5
Bromomethane	0.43	0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	0.05	0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	0.4	1	<1	<1	<1	<1
Chloroform	0.13	0.5	<0.5	<0.5	0.48 est	0.38 est
Chloromethane	0.41	1	<1	<1	<1	<1
Dibromochloromethane	0.25	0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.2	0.5	<0.5	<0.5	<0.5	<0.5
Total xylene isomers	0.21	1	<1	<1	0.15 est	<1
Trichloroethene	0.12	0.5	<0.5	<0.5	13	12
Trichlorofluoromethane	0.1	0.5	<0.5	<0.5	<0.5	<0.5

Table 8-72. First quarter(a) analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL(b)	RL(c)	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
EPA Method 625 (µg/L)						
1,2,4-Trichlorobenzene	0.295	2	<2	<2	<2	<2
1,2-Dichlorobenzene	0.403	2	<2	<2	<2	<2
1,2-Diphenylhydrazine	0.434	2	<2	<2	<2	<2
1,3-Dichlorobenzene	0.364	2	<2	<2	<2	<2
1,4-Dichlorobenzene	0.376	2	<2	<2	<2	<2
2,4,5-Trichlorophenol	0.394	5	<5	<5	<5	<5
2,4,6-Trichlorophenol	0.423	5	<5	<5	<5	<5
2,4-Dichlorophenol	0.367	2	<2	<2	<2	<2
2,4-Dimethylphenol	0.589	2	<2	<2	<2	<2
2,4-Dinitrophenol	1.531	10	<10	<10	<10	<10
2,4-Dinitrotoluene	0.347	2	<2	<2	<2	<2
2,6-Dinitrotoluene	0.334	2	<2	<2	<2	<2
2-Chloronaphthalene	0.377	2	<2	<2	<2	<2
2-Chlorophenol	0.467	2	<2	<2	<2	<2
2-Methyl-4,6-dinitrophenol	1.867	10	<10	<10	<10	<10
2-Methylnaphthalene	0.359	2	<2	<2	<2	<2
2-Naphthylamine	1.538	20	<20	<20	<20	<20
2-Nitroaniline	0.442	2	<2	<2	<2	<2
2-Nitrophenol	0.356	2	<2	<2	<2	<2
3,3'-Dichlorobenzidine	0.612	5	<5	<5	<5	<5
3-Nitroaniline	0.485	2	<2	<2	<2	<2
4-Bromophenylphenylether	0.488	2	<2	<2	<2	<2
4-Chloro-3-methylphenol	0.412	5	<5	<5	<5	<5
4-Chloroaniline	0.44	2	<2	<2	<2	<2
4-Chlorophenylphenylether	0.417	2	<2	<2	<2	<2
4-Nitroaniline	0.582	5	<5	<5	<5	<5
4-Nitrophenol	0.747	5	<5	<5	<5	<5
Acenaphthene	0.415	2	<2	<2	<2	<2
Acenaphthylene	0.425	2	<2	<2	<2	<2
Aldrin	0.535	2	<2	<2	<2	2
Aniline	0.505	5	<5	<5	<5	5
Anthracene	0.466	2	<2	<2	<2	<2
BHC, alpha isomer	0.498	2	<2	<2	<2	2
BHC, beta isomer	0.435	2	<2	<2	<2	2
BHC, delta isomer	0.391	2	<2	<2	<2	2

Table 8-72. First quarter[a] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL[b]	RL[c]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
EPA Method 625 (µg/L) (cont'd)						
BHC, gamma isomer (Lindane)	0.416	2	<2	<2	<2	2
Benzidine	1.832	20	<20	<20	<20	20
Benzo[*a*]anthracene	0.392	2	<2	<2	<2	<2
Benzo[*a*]pyrene	0.444	2	<2	<2	<2	<2
Benzo[*b*]fluoranthene	0.357	2	<2	<2	<2	<2
Benzo[*g,h,i*]perylene	0.579	2	<2	<2	<2	<2
Benzo[*k*]fluoranthene	0.361	2	<2	<2	<2	<2
Benzoic acid	0.253	10	<10	<10	<10	<10
Benzyl alcohol	0.426	2	<2	<2	<2	<2
Bis(2-chloroethoxy)methane	0.404	2	<2	<2	<2	<2
Bis(2-chloroethyl)ether	0.429	2	<2	<2	<2	<2
Bis(2-chloroisopropyl)ether	0.41	2	<2	<2	<2	<2
Bis(2-ethylhexyl)phthalate	0.673	5	<5	<5	<5	<5
Butylbenzylphthalate	0.485	2	<2	<2	<2	<2
Chrysene	0.428	2	<2	<2	<2	<2
Di-*n*-butylphthalate	0.493	2	<2	<2	<2	2
Dibenzo[*a,h*]anthracene	0.535	3	<3	<3	<3	<3
Dibenzofuran	0.42	2	<2	<2	<2	<2
Dieldrin	0.805	3	<3	<3	<3	3
Diethylphthalate	0.437	5	<2	<2	<2	<2
Dimethylphthalate	0.363	5	<2	<2	<2	<2
Endosulfan I	5	10	<10	<10	<10	<10
Endosulfan II	5	10	<10	<10	<10	<10
Endosulfan sulfate	0.722	3	<3	<3	<3	<3
Endrin	0.5	2	<2	<2	<2	<2
Endrin aldehyde	1	2	<2	<2	<2	<2
Fluoranthene	0.394	2	<2	<2	<2	<2
Fluorene	0.402	2	<2	<2	<2	<2
Heptachlor	0.428	2	<2	<2	<2	<2
Heptachlor epoxide	0.439	2	<2	<2	<2	<2
Hexachlorobenzene	0.432	2	<2	<2	<2	<2
Hexachlorobutadiene	0.384	2	<2	<2	<2	<2
Hexachlorocyclopentadiene	0.322	2	<2	<2	<2	<2
Hexachloroethane	0.31	2	<2	<2	<2	<2
Indeno[*1,2,3-c,d*]pyrene	0.553	2	<2	<2	<2	<2
Isophorone	0.372	2	<2	<2	<2	<2

Table 8-72. First quarter[(a)] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (concluded).

Parameter	MDL[(b)]	RL[(c)]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
EPA Method 625 (µg/L) (cont'd)						
N-Nitrosodi-*n*-propylamine	0.397	2	<2	<2	<2	<2
N-Nitrosodimethylamine	0.316	2	<2	<2	<2	<2
N-Nitrosodiphenylamine	0.424	2	<2	<2	<2	<2
Nitrobenzene	0.376	2	<2	<2	<2	<2
Pentachlorophenol	1.841	10	<10	<10	<10	<10
Phenanthrene	0.449	2	<2	<2	<2	<2
Phenol	0.209	2	<2	<2	<2	<2
Pyrene	0.554	2	<2	<2	<2	<2
p,p'-DDD	0.644	2	<2	<2	<2	<2
p,p'-DDE	0.714	3	<3	<3	<3	<3
p,p'-DDT	0.644	2	<2	<2	<2	<2
Energetic materials (µg/L)						
1,3,5-Trinitrobenzene	0.12	0.45	<0.45	<0.45	<0.45	<0.45
1,3-Dinitrobenzene	0.16	0.3	<0.3	<0.3	<0.3	<0.3
2,4-Dinitrotoluene	0.13	0.26	<0.26	<0.26	<0.26	<0.26
2,6-Dinitrotoluene	0.16	0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-dinitrotoluene	0.12	0.26	<0.26	<0.26	<0.26	<0.26
4-Amino-2,6-dinitrotoluene	0.12	0.26	12	<0.26	0.62	0.49
2-Nitrotoluene	0.12	0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	0.15	0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	0.23	0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	0.15	0.5	<0.5	<0.5	<0.5	<0.5
Tetryl	0.21	1	<1	<1	<1	<1

[a] Date(s) sampled: 1/6/97–1/7/97.

[b] MDL = Method detection limit.

[c] RL = Reporting limit = Practical quantitation limit (PQL) for BC and for LAS, Inc. Analyses for energetic materials were performed by LAS, Inc.; all other analyses were performed by BC Laboratories, Inc.

[d] NA = Not applicable.

[e] Sample values followed by an "est" have values between the method detection limit and the reporting limit for that compound.

Table 8-73. Second quarter[a] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments.

Parameter	MDL[b]	RL[c]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
General						
Ground water elevation (m above MSL)	NA[d]		638.4	591.9	576.3	610.7
	NA		638.3	591.9	576.3	610.7
	NA		638.4	592.1	576.3	610.7
	NA		638.4	592.0	576.5	610.8
pH (pH units)	NA	0.1	8.16	7.98	8.1	8.08
Field pH (pH units)	NA	NA	8.5	7.9	8.1	7.9
	NA	NA	8.5	8.2	8.5	8.4
	NA	NA	8.1	7.8	7.9	7.8
	NA	NA	8.1	7.9	8.0	7.9
Specific conductance (µmho/cm)	1	1	1420	2340	1770	1820
Field specific conductance (µmho/cm)			1.5	2.2	1.7	1.7
	NA	NA	1.5	2.3	1.8	1.9
	NA	NA	1.5	2.3	1.8	1.9
	NA	NA	1.5	2.3	1.7	1.9
Total dissolved solids (mg/L)	5	10	895	1480	1080	1130
Water temperature (°C)	NA	NA	21.4	23.9	20.5	21.5
	NA	NA	23.1	21.2	20.3	20.8
	NA	NA	24.4	21.5	20.9	22.0
	NA	NA	22.1	23.5	21.1	21.8
Nitrite (as N)	0.01	0.02	0.02	<0.02	<0.02	<0.02
Nitrate (as N)	0.05	0.1	19	20	20	21
Total phosphorus (as PO_4)	0.02	0.05			<0.05	
	0.03	0.05	0.05	0.06		0.06
Metals and minerals (mg/L)						
Antimony	0.00063	0.004	<0.004	<0.004	<0.004	<0.004
Carbonate alkalinity (as $CaCO_3$)	1	1	21.3	<1	<1	<1
Hydroxide alkalinity (as $CaCO_3$)	0.8	1	<1	<1	<1	<1
Total alkalinity (as $CaCO_3$)	1	1	253	238	252	258
Beryllium	0.00008	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Boron	0.0031	0.05	1.9	2.6	2.6	2.9
Calcium	0.03	0.1	15.3	37	19.5	18.9
Fluoride	0.01	0.05	0.96	0.77	1.2	1.2
Total hardness (as $CaCO_3$)	1	1	67.4	173	90.3	86.7
Iron	0.0056	0.05	0.22	0.013 est[e]	<0.05	0.045 est
	0.0056	0.05	0.08	0.014 est	<0.05	<0.05

Table 8-73. Second quarter(a) analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL(b)	RL(c)	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
Metals and minerals (mg/L) (cont'd)						
Magnesium	0.002	0.01	7.1	19.7	10.1	9.6
Mercury	0.0001	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Selenium	0.0005	0.01	0.037	0.075	0.031	0.028
Sodium	0.04	0.1	282	434	339	358
Surfactants	0.02	0.05	<0.05	<0.05	<0.05	<0.05
Thallium	0.00026	0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	0.0031	0.01	0.14	0.15	0.14	0.14
EPA Method 624 (µg/L)						
1,1,2,2-Tetrachloroethane	0.21	0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.36	0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.13	0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	0.12	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.11	0.5	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethene	0.1	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.12	0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.09	0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.12	0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.17	0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	0.27	0.5	<0.5	<0.5	<0.5	<0.5
Benzene	0.14	0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.18	0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.43	0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	0.05	0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	0.4	1	<1	<1	<1	<1
Chloroform	0.13	0.5	<0.5	<0.5	0.19 est	0.23 est
Chloromethane	0.41	1	<1	<1	<1	<1
Dibromochloromethane	0.25	0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.2	0.5	<0.5	<0.5	<0.5	<0.5
Total xylene isomers	0.21	1	<1	<1	<1	<1
Trichloroethene	0.12	0.5	<0.5	<0.5	13	9.6
Trichlorofluoromethane	0.1	0.5	<0.5	<0.5	<0.5	<0.5
EPA Method 625 (µg/L)						
1,2,4-Trichlorobenzene	0.295	2	<2	<2	<2	<2
1,2-Dichlorobenzene	0.403	2	<2	<2	<2	<2
1,2-Diphenylhydrazine	0.434	2	<2	<2	<2	<2

Table 8-73. Second quarter[a] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL[b]	RL[c]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
EPA Method 625 (µg/L) (cont'd)						
1,3-Dichlorobenzene	0.364	2	<2	<2	<2	<2
1,4-Dichlorobenzene	0.376	2	<2	<2	<2	<2
2,4,5-Trichlorophenol	0.394	5	<5	<5	<5	<5
2,4,6-Trichlorophenol	0.423	5	<5	<5	<5	<5
2,4-Dichlorophenol	0.367	2	<2	<2	<2	<2
2,4-Dimethylphenol	0.589	2	<2	<2	<2	<2
2,4-Dinitrophenol	1.531	10	<10	<10	<10	<10
2,4-Dinitrotoluene	0.347	2	<2	<2	<2	<2
2,6-Dinitrotoluene	0.334	2	<2	<2	<2	<2
2-Chloronaphthalene	0.377	2	<2	<2	<2	<2
2-Chlorophenol	0.467	2	<2	<2	<2	<2
2-Methyl-4,6-dinitrophenol	1.867	10	<10	<10	<10	<10
2-Methylnaphthalene	0.359	2	<2	<2	<2	<2
2-Naphthylamine	1.538	20	<20	<20	<20	<20
2-Nitroaniline	0.442	2	<2	<2	<2	<2
2-Nitrophenol	0.356	2	<2	<2	<2	<2
3,3'-Dichlorobenzidine	0.612	5	<5	<5	<5	<5
3-Nitroaniline	0.485	2	<2	<2	<2	<2
4-Bromophenylphenylether	0.488	2	<2	<2	<2	<2
4-Chloro-3-methylphenol	0.412	5	<5	<5	<5	<5
4-Chloroaniline	0.44	2	<2	<2	<2	<2
4-Chlorophenylphenylether	0.417	2	<2	<2	<2	<2
4-Nitroaniline	0.582	5	<5	<5	<5	<5
4-Nitrophenol	0.747	5	<5	<5	<5	<5
Acenaphthene	0.415	2	<2	<2	<2	<2
Acenaphthylene	0.425	2	<2	<2	<2	<2
Aldrin	0.535	2	<2	<2	<2	<2
Aniline	0.505	5	<5	<5	<5	<5
Anthracene	0.466	2	<2	<2	<2	<2
BHC, alpha isomer	0.498	2	<2	<2	<2	<2
BHC, beta isomer	0.435	2	<2	<2	<2	<2
BHC, delta isomer	0.391	2	<2	<2	<2	<2
BHC, gamma isomer (Lindane)	0.416	2	<2	<2	<2	<2
Benzo[*a*]anthracene	0.392	2	<2	<2	<2	<2
Benzo[*a*]pyrene	0.444	2	<2	<2	<2	<2
Benzo[*b*]fluoranthene	0.357	2	<2	<2	<2	<2

Table 8-73. Second quarter[a] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL[b]	RL[c]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
EPA Method 625 (µg/L) (cont'd)						
Benzo[*g,h,i*]perylene	0.579	2	<2	<2	<2	<2
Benzo[*k*]fluoranthene	0.361	2	<2	<2	<2	<2
Benzoic acid	0.253	10	<10	<10	<10	<10
Benzyl alcohol	0.426	2	<2	<2	<2	<2
Bis(2-chloroethoxy)methane	0.404	2	<2	<2	<2	<2
Bis(2-chloroethyl)ether	0.429	2	<2	<2	<2	<2
Bis(2-chloroisopropyl)ether	0.41	2	<2	<2	<2	<2
Bis(2-ethylhexyl)phthalate	0.673	5	<5	<5	<5	<5
Butylbenzylphthalate	0.485	2	<2	<2	<2	<2
Chrysene	0.428	2	<2	<2	<2	<2
Dibenzo[*a,h*]anthracene	0.535	3.	<3	<3	<3	<3
Dibenzofuran	0.42	2	<2	<2	<2	<2
Dibutylphthalate	0.493	2	<2	<2	<2	<2
Dieldrin	0.805	3	<3	<3	<3	<3
Diethylphthalate	0.437	2	<2	<2	<2	<2
Dimethylphthalate	0.363	2	<2	<2	<2	<2
Endosulfan I	5	10	<10	<10	<10	<10
Endosulfan II	5	10	<10	<10	<10	<10
Endosulfan sulfate	0.722	3	<3	<3	<3	<3
Endrin	0.5	2	<2	<2	<2	<2
Fluoranthene	0.394	2	<2	<2	<2	<2
Fluorene	0.402	2	<2	<2	<2	<2
Heptachlor	0.428	2	<2	<2	<2	<2
Heptachlor epoxide	0.439	2	<2	<2	<2	<2
Hexachlorobenzene	0.432	2	<2	<2	<2	<2
Hexachlorobutadiene	0.384	2	<2	<2	<2	<2
Hexachlorocyclopentadiene	0.322	2	<2	<2	<2	<2
Hexachloroethane	0.31	2	<2	<2	<2	<2
Indeno[*1,2,3-c,d*]pyrene	0.553	2	<2	<2	<2	<2
Isophorone	0.372	2	<2	<2	<2	<2
N-Nitrosodi-*n*-propylamine	0.397	2	<2	<2	<2	<2
N-Nitrosodimethylamine	0.316	2	<2	<2	<2	<2
N-Nitrosodiphenylamine	0.424	2	<2	<2	<2	<2
Nitrobenzene	0.376	2	<2	<2	<2	<2
Pentachlorophenol	1.841	10	<10	<10	<10	<10
Phenanthrene	0.449	2	<2	<2	<2	<2

Table 8-73. Second quarter[a] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (concluded).

Parameter	MDL[b]	RL[c]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
EPA Method 625 (µg/L) (cont'd)						
Phenol	0.209	2	<2	<2	<2	<2
Pyrene	0.554	2	<2	<2	<2	<2
p,p'-DDD	0.644	2	<2	<2	<2	<2
p,p'-DDE	0.714	3	<3	<3	<3	<3
p,p'-DDT	0.644	2	<2	<2	<2	<2
Energetic materials (µg/L)						
1,3,5-Trinitrobenzene	0.12	0.45	<0.45	<0.45	<0.45	<0.45
1,3-Dinitrobenzene	0.16	0.3	<0.3	<0.3	<0.3	<0.3
2,4-Dinitrotoluene	0.13	0.26	<0.26	<0.26	<0.26	<0.26
2,6-Dinitrotoluene	0.16	0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-dinitrotoluene	0.12	0.26	<0.26	<0.26	<0.26	<0.26
4-Amino-2,6-dinitrotoluene	0.12	0.26	13	<0.26	<0.26	0.45
2-Nitrotoluene	0.12	0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	0.15	0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	0.23	0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	0.15	0.5	<0.5	<0.5	<0.5	<0.5
Tetryl	0.21	1	<1	<1	<1	<1

a Dates sampled: 4/1/97–4/21/97.

b MDL = Method detection limit.

c RL = Reporting limit = Practical quantitation limit (PQL) for BC and for LAS, Inc. Analyses for energetic materials were performed by LAS, Inc.; all other analyses were performed by BC Laboratories, Inc.

d NA = Not applicable.

e Sample values followed by an "est" have values between the method detection limit and the reporting limit for that compound.

Table 8-74. Third quarter[a] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments.

Parameter	MDL[b]	RL[c]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
General						
Ground water elevation (m above MSL)	NA[d]	NA	638.61	592.53	576.61	611.24
	NA	NA	638.59	592.48	576.55	611.28
	NA	NA	638.54	592.56	576.61	611.22
	NA	NA	638.59	592.61	576.71	611.34
pH (pH units)	NA	0	8.09	7.91	8.05	7.94
Field pH (pH units)	NA	NA	7.86	7.7	7.85	7.89
	NA	NA	8.12	7.94	8	8.05
	NA	NA	7.7	7.55	7.63	7.73
	NA	NA	7.9	7.74	7.86	7.73
Specific conductance (µmho/cm)	1	1	1420	2350	1730	1840
Field specific conductance (µmho/cm)	NA	NA	1500	2400	1900	1900
	NA	NA	1387	2300	1752	1808
	NA	NA	1500	2400	1900	1900
	NA	NA	1500	2300	1900	2000
Total dissolved solids (mg/L)	5	10	910	1500	1090	1140
Water temperature (°C)	NA	NA	24.1	24.3	20.9	22
	NA	NA	23	22.8	20.9	24.1
	NA	NA	25	23.3	21.1	23.3
	NA	NA	23.7	23	21.4	23.2
Nitrite (as N)	0.01	0.02	<0.02	<0.02	<0.02	0.015 est[e]
Nitrate (as N)	0.05	0.5	18.9	20	20	18.9
Total phosphorus (as PO_4)	0.02	0.05	0.048 est	0.05	0.03 est	0.04 est
Metals and minerals (mg/L)						
Carbonate alkalinity (as $CaCO_3$)	2.6	1	<1	<1	<1	<1
Hydroxide alkalinity (as $CaCO_3$)	0.8	1	<1	<1	<1	<1
Total alkalinity (as $CaCO_3$)	0	1	254	238	254	260
Calcium	0.03	1	16.2	37	19.6	19.2
Fluoride	0.01	0.05	1	0.91	1.3	1.3
Total hardness (as $CaCO_3$)	0	1	71.3	153	94.2	94
Iron	0.0053	0.05	0.027 est	0.007 est	0.024 est	0.02 est
Magnesium	0.002	0.1	7.5	14.7	11	11.2
Sodium	0.04	5	294	457	351	378
Surfactants	0.02	0.05	<0.05	<0.05	<0.05	<0.05

Table 8-74. Third quarter[(a)] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL[(b)]	RL[(c)]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
EPA Method 624 (µg/L)						
1,1,2,2-Tetrachloroethane	0.21	0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.36	0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.13	0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	0.12	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.11	0.5	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethene	0.1	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethene (total)	0.5	1	<1	<1	<1	<1
1,2-Dichloropropane	0.12	0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.09	0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.12	0.5	<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinylether	2	5	<5	<5	<5	<5
cis-1,2-Dichloroethene	0.25	0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.17	0.5	<0.5	<0.5	<0.5	<0.5
2-Hexanone	10	20	<20	<20	<20	<20
trans-1,3-Dichloropropene	0.27	0.5	<0.5	<0.5	<0.5	<0.5
4-Methyl-2-pentanone	10	20	<20	<20	<20	<20
Benzene	0.14	0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.18	0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.43	0.5	<0.5	<0.5	<0.5	<0.5
Carbon disulfide	2.5	5	<5	<5	<5	<5
Carbon tetrachloride	0.05	0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	0.4	1	<1	<1	<1	<1
Chloroform	0.13	0.5	<0.5	<0.5	<0.5	<0.5
Chloromethane	0.41	1	<1	<1	<1	<1
Dibromochloromethane	0.25	0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	0.25	0.5	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	0.25	0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.2	0.5	<0.5	<0.5	<0.5	<0.5
Total xylene isomers	0.21	1	<1	<1	<1	<1
Trichloroethene	0.12	0.5	<0.5	<0.5	13	8.7
Trichlorofluoromethane	0.1	0.5	<0.5	<0.5	<0.5	<0.5
EPA Method 625 (µg/L)						
1,2,4-Trichlorobenzene	0.295	2	<2	<2	<2	<2
1,2-Dichlorobenzene	0.403	2	<2	<2	<2	<2
1,2-Diphenylhydrazine	0.434	2	<2	<2	<2	<2

Table 8-74. Third quarter[a] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL[b]	RL[c]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
EPA Method 625 (µg/L) (cont'd)						
1,3-Dichlorobenzene	0.364	2	<2	<2	<2	<2
1,4-Dichlorobenzene	0.376	2	<2	<2	<2	<2
2,4,5-Trichlorophenol	0.394	5	<5	<5	<5	<5
2,4,6-Trichlorophenol	0.423	5	<5	<5	<5	<5
2,4-Dichlorophenol	0.367	2	<2	<2	<2	<2
2,4-Dimethylphenol	0.589	2	<2	<2	<2	<2
2,4-Dinitrophenol	1.531	10	<10	<10	<10	<10
2,4-Dinitrotoluene	0.347	2	<2	<2	<2	<2
2,6-Dinitrotoluene	0.334	2	<2	<2	<2	<2
2-Chloronaphthalene	0.377	2	<2	<2	<2	<2
2-Chlorophenol	0.467	2	<2	<2	<2	<2
2-Methyl-4,6-dinitrophenol	1.867	10	<10	<10	<10	<10
2-Methylnaphthalene	0.359	2	<2	<2	<2	<2
2-Naphthylamine	1.538	20	<20	<20	<20	<20
2-Nitroaniline	0.442	2	<2	<2	<2	<2
2-Nitrophenol	0.356	2	<2	<2	<2	<2
3,3-Dichlorobenzidine	0.612	5	<5	<5	<5	<5
3-Nitroaniline	0.485	2	<2	<2	<2	<2
4-Bromophenylphenylether	0.488	2	<2	<2	<2	<2
4-Chloro-3-methylphenol	0.412	5	<5	<5	<5	<5
4-Chloroaniline	0.44	2	<2	<2	<2	<2
4-Chlorophenylphenylether	0.417	2	<2	<2	<2	<2
4-Nitroaniline	0.582	5	<5	<5	<5	<5
4-Nitrophenol	0.747	5	<5	<5	<5	<5
Acenaphthene	0.415	2	<2	<2	<2	<2
Acenaphthylene	0.425	2	<2	<2	<2	<2
Aldrin	0.535	2	<2	<2	<2	<2
Aniline	0.505	5	<5	<5	<5	<5
Anthracene	0.466	2	<2	<2	<2	<2
BHC, alpha isomer	0.498	2	<2	<2	<2	<2
BHC, beta isomer	0.435	2	<2	<2	<2	<2
BHC, delta isomer	0.391	2	<2	<2	<2	<2
BHC, gamma isomer (Lindane)	0.416	2	<2	<2	<2	<2
Benzidine	1.832	20	<20	<20	<20	<20

Table 8-74. Third quarter[a] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL[b]	RL[c]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
EPA Method 625 (µg/L) (cont'd)						
Benzo[*a*]anthracene	0.392	2	<2	<2	<2	<2
Benzo[*a*]pyrene	0.444	2	<2	<2	<2	<2
Benzo[*b*]fluoranthene	0.357	2	<2	<2	<2	<2
Benzo[*g,h,i*]perylene	0.579	2	<2	<2	<2	<2
Benzo(k)fluoranthene	0.361	2	<2	<2	<2	<2
Benzoic acid	0.253	10	<10	<10	<10	<10
Benzyl alcohol	0.426	2	<2	<2	<2	<2
Bis(2-chloroethoxy)methane	0.404	2	<2	<2	<2	<2
Bis(2-chloroethyl)ether	0.429	2	<2	<2	<2	<2
Bis(2-chloroisopropyl)ether	0.41	2	<2	<2	<2	<2
Bis(2-ethylhexyl)phthalate	0.673	5	<5	<5	<5	<5
Butylbenzylphthalate	0.485	2	<2	<2	<2	<2
Chrysene	0.428	2	<2	<2	<2	<2
Dibenzo[*h,a*]anthracene	0.535	3	<3	<3	<3	<3
Dibenzofuran	0.42	2	<2	<2	<2	<2
Dibutylphthalate	0.493	2	<2	<2	<2	<2
Dieldrin	0.805	3	<3	<3	<3	<3
Diethylphthalate	0.437	2	<2	<2	<2	<2
Dimethylphthalate	0.363	2	<2	<2	<2	<2
Endosulfan I	5	10	<10	<10	<10	<10
Endosulfan II	5	10	<10	<10	<10	<10
Endosulfan sulfate	0.722	3	<3	<3	<3	<3
Endrin	0.5	2	<2	<2	<2	<2
Endrin aldehyde	1	2	<2	<2	<2	<2
Fluoranthene	0.394	2	<2	<2	<2	<2
Fluorene	0.402	2	<2	<2	<2	<2
Heptachlor	0.428	2	<2	<2	<2	<2
Heptachlor epoxide	0.439	2	<2	<2	<2	<2
Hexachlorobenzene	0.432	2	<2	<2	<2	<2
Hexachlorobutadiene	0.384	2	<2	<2	<2	<2
Hexachlorocyclopentadiene	0.322	2	<2	<2	<2	<2
Hexachloroethane	0.31	2	<2	<2	<2	<2
Indeno[*1,2,3-c,d*]pyrene	0.553	2	<2	<2	<2	<2
Isophorone	0.372	2	<2	<2	<2	<2
N-Nitrosodi-*n*-propylamine	0.397	2	<2	<2	<2	<2

Table 8-74. Third quarter[(a)] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (concluded).

Parameter	MDL[(b)]	RL[(c)]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
EPA Method 625 (µg/L) (cont'd)						
N-Nitrosodimethylamine	0.316	2	<2	<2	<2	<2
N -Nitrosodiphenylamine	0.424	2	<2	<2	<2	<2
Nitrobenzene	0.376	2	<2	<2	<2	<2
Pentachlorophenol	1.841	10	<10	<10	<10	<10
Phenanthrene	0.449	2	<2	<2	<2	<2
Phenol	0.209	2	<2	<2	<2	<2
Pyrene	0.554	2	<2	<2	<2	<2
p,p'-DDD	0.644	2	<2	<2	<2	<2
p,p'-DDE	0.714	3	<3	<3	<3	<3
p,p'-DDT	0.644	2	<2	<2	<2	<2
Energetic materials (µg/L)						
1,3,5-Trinitrobenzene	0.04	0.45	<0.45	<0.45	<0.45	<0.45
1,3-Dinitrobenzene	0.03	0.3	<0.30	<0.30	<0.3	<0.30
2,4-Dinitrotoluene	0.11	0.26	<0.26	<0.26	<0.26	<0.26
2,6-Dinitrotoluene	0.07	0.25	<0.25	<0.25	<0.25	0.3
2-Amino-4,6-dinitrotoluene	0.04	0.26	<0.26	<0.26	<0.26	<0.26
4-Amino-2,6-dinitrololuene	0.05	0.26	18	<0.26	<0.26	0.4
2-Nitrotoluene	0.03	0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	0.02	0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	0.03	0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	0.04	0.5	<0.50	<0.5	<0.5	<0.5
Tetryl	0.04	1	<1	<1	<1	<1

a Dates sampled: 7/7/97–7/29/97.

b MDL = Method detection limit.

c RL = Reporting limit = Practical quantitation limit (PQL) for BC and for LAS, Inc. Analyses for energetic materials were performed by LAS, Inc.; all other analyses were performed by BC Laboratories, Inc.

d NA = Not applicable.

e Sample values followed by an "est" have values between the method detection limit and the reporting limit for that compound.

Table 8-75. Fourth quarter[a] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments.

Parameter	MDL[b]	RL[c]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
General						
Ground water elevation (m above MSL)	NA[d]	NA	638.77	592.63	576.84	611.47
	NA	NA	638.71	592.61	576.94	611.54
	NA	NA	638.73	592.61	576.92	611.54
	NA	NA	638.73	592.56	576.77	611.49
pH (pH units)	NA	NA	8.26	8.09	8.09	8.25
Field pH (pH units)	NA	NA	8.11	7.92	7.96	8.04
	NA	NA	7.98	7.75	7.85	7.9
	NA	NA	8.31	8.12	8.18	8.16
	NA	NA	8.29	7.98	8.2	8.14
Specific conductance (µmho/cm)	1	1	1420	2300	1730	1860
Field specific conductance (µmho/cm)			1500	2400	1800	1813
	NA	NA	1500	2400	1800	1900
	NA	NA	1500	2400	1900	1900
	NA	NA	1500	2400	1700	1900
Total dissolved solids (mg/L)	5	10	880	1470	1080	1100
Water temperature (Celsius)	NA	NA	22	20.8	19	22.3
	NA	NA	24.1	21.6	21	22.4
	NA	NA	21.5	19.8	20.2	20.5
	NA	NA	22.2	21.2	18.8	21.5
Nitrite (as N)	0.01	0.02	0.13 est[e]	<0.02	<0.02	<0.02
Nitrate (as N)	0.05	0.5	12	17	17	15
Total phosphorus (as PO_4)	0.02	0.05	0.07	<0.05	<0.05	0.05
Metals and minerals (mg/L)						
Carbonate alkalinity (as $CaCO_3$)	1	1	24	<1	<1	<1
Hydroxide alkalinity (as $CaCO_3$)	0.8	1	<1	<1	<1	<1
Total alkalinity (as $CaCO_3$)	1	1	256	237	251	249
Calcium	0.019	0.05	17	37	21	19
Fluoride	0.02	0.05	0.96	0.82	1.2	1.2
Total hardness (as $CaCO_3$)		1	74	171	98	85
Iron	0.005	0.05	<0.05	<0.05	<0.05	<0.05
Magnesium	0.027	0.05	7.6	19	11	9.1
Sodium	0.05	0.1	271	405	320	328
Surfactants	0.02	0.05	<0.05	<0.05	<0.05	<0.05
Iron	0.005	0.05	<0.05	<0.05	<0.05	<0.05
Magnesium	0.027	0.05	7.6	19	11	9.1

Table 8-75. Fourth quarter[a] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL[b]	RL[c]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
Volatile organic compounds (µg/L)						
1,1,2,2-Tetrachloroethane	0.21	0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.36	0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.13	0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	0.12	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.11	0.5	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethene	0.1	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethene (total)	0.46	0.5	<0.5			
1,2-Dichloroethene (total)	0.46	1		<1	<1	<1
1,2-Dichloropropane	0.12	0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.09	0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.12	0.5	<0.5	<0.5	<0.5	<0.5
Cis-1,2-Dichloroethene	0.36	0.5	<0.5	<0.5	<0.5	<0.5
Cis-1,3-Dichloropropene	0.17	0.5	<0.5	<0.5	<0.5	<0.5
2-Hexanone	2.4	20	<20	<20	<20	<20
trans-1,3-Dichloropropene	0.27	0.5	<0.5	<0.5	<0.5	<0.5
4-Methyl-2-pentanone	2.1	20	<20	<20	<20	<20
Benzene	0.14	0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.18	0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.43	0.5	<0.5	<0.5	<0.5	<0.5
Carbon disulfide	0.19	5	<5	<5	<5	<5
Carbon tetrachloride	0.05	0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	0.4	1	<1	<1	<1	<1
Chloroform	0.13	0.5	<0.5	<0.5	0.29 est[e]	<0.5
Chloromethane	0.41	1	<1	<1	<1	<1
Dibromochloromethane	0.25	0.5	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	0.2	0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.2	0.5	<0.5	<0.5	<0.5	<0.5
Total xylene isomers	0.21	1	<1	<1	<1	<1
Trichloroethene	0.12	0.5	0.016 est	0.47 est	14	12
Trichlorofluoromethane	0.1	0.5	<0.5	<0.5	<0.5	<0.5
Semivolatile organic compounds (µg/L)						
1,2,4-Trichlorobenzene	0.295	2	<2	<2	<2	<2
1,2-Dichlorobenzene	0.403	2	<2	<2	<2	<2
1,2-Diphenylhydrazine	0.434	2	<2	<2	<2	<2
1,3-Dichlorobenzene	0.364	2	<2	<2	<2	<2

Table 8-75. Fourth quarter(a) analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL(b)	RL(c)	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
Semivolatile organic compounds (µg/L) (cont'd)						
1,4-Dichlorobenzene	0.376	2	<2	<2	<2	<2
2,4,5-Trichlorophenol	0.394	5	<5	<5	<5	<5
2,4,6-Trichlorophenol	0.423	5	<5	<5	<5	<5
2,4-Dichlorophenol	0.367	2	<2	<2	<2	<2
2,4-Dimethylphenol	0.589	2	<2	<2	<2	<2
2,4-Dinitrophenol	1.531	10	<10	<10	<10	<10
2,4-Dinitrotoluene	0.347	2	<2	<2	<2	<2
2,6-Dinitrotoluene	0.334	2	<2	<2	<2	<2
2-Chloronaphthalene	0.377	2	<2	<2	<2	<2
2-Chlorophenol	0.467	2	<2	<2	<2	<2
2-Methyl-4,6-dinitrophenol	1.867	10	<10	<10	<10	<10
2-Methylnaphthalene	0.359	2	<2	<2	<2	<2
2-Nitroaniline	0.442	2	<2	<2	<2	<2
2-Nitrophenol	0.356	2	<2	<2	<2	<2
3,3-Dichlorobenzidine	0.612	5	<5	<5	<5	<5
3-Nitroaniline	0.485	2	<2	<2	<2	<2
4-Bromophenylphenylether	0.488	2	<2	<2	<2	<2
4-Chloro-3-methylphenol	0.412	5	<5	<5	<5	<5
4-Chloroaniline	0.44	2	<2	<2	<2	<2
4-Chlorophenylphenylether	0.417	2	<2	<2	<2	<2
4-Nitroaniline	0.582	5	<5	<5	<5	<5
4-Nitrophenol	0.747	5	<5	<5	<5	<5
Acenaphthene	0.415	2	<2	<2	<2	<2
Acenaphthylene	0.425	2	<2	<2	<2	<2
Aldrin	0.535	2	<2	<2	<2	<2
Aniline	0.505	5	<5	<5	<5	<5
Anthracene	0.466	2	<2	<2	<2	<2
BHC, alpha isomer	0.498	2	<2	<2	<2	<2
BHC, beta isomer	0.435	2	<2	<2	<2	<2
BHC, delta isomer	0.391	2	<2	<2	<2	<2
BHC, gamma isomer (Lindane)	0.416	2	<2	<2	<2	<2
Benzo[*a*]anthracene	0.392	2	<2	<2	<2	<2
Benzo[*a*]pyrene	0.444	2	<2	<2	<2	<2
Benzo[*b*]fluoranthene	0.357	2	<2	<2	<2	<2

Table 8-75. Fourth quarter[(a)] analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (continued).

Parameter	MDL[(b)]	RL[(c)]	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
Semivolatile organic compounds (µg/L) (cont'd)						
Benzo[*g,h,i*]perylene	0.579	2	<2	<2	<2	<2
Benzo[*k*]fluoranthene	0.361	2	<2	<2	<2	<2
Benzoic Acid	0.253	10	<10	<10	<10	<10
Benzyl Alcohol	0.426	2	<2	<2	<2	<2
Bis(2-chloroethoxy)methane	0.404	2	<2	<2	<2	<2
Bis(2-chloroethyl)ether	0.429	2	<2	<2	<2	<2
Bis(2-chloroisopropyl)ether	0.41	2	<2	<2	<2	<2
Bis(2-ethylhexyl)phthalate	0.673	5	<5	1.7 est	<5	<5
Butylbenzylphthalate	0.485	2	<2	<2	<2	<2
Chrysene	0.428	2	<2	<2	<2	<2
Dibenzo[*a,h*]anthracene	0.535	3	<3	<3	<3	<3
Dibenzofuran	0.42	2	<2	<2	<2	<2
Dibutylphthalate	0.493	2	<2	<2	<2	<2
Dieldrin	0.805	3	<3	<3	<3	<3
Diethylphthalate	0.437	2	<2	<2	<2	<2
Dimethylphthalate	0.363	2	<2	<2	<2	<2
Endosulfan I	5	10	<10	<10	<10	<10
Endosulfan II	5	10	<10	<10	<10	<10
Endosulfan sulfate	0.722	3	<3	<3	<3	<3
Endrin	0.5	2	<2	<2	<2	<2
Fluoranthene	0.394	2	<2	<2	<2	<2
Fluorene	0.402	2	<2	<2	<2	<2
Heptachlor	0.428	2	<2	<2	<2	<2
Heptachlor epoxide	0.439	2	<2	<2	<2	<2
Hexachlorobenzene	0.432	2	<2	<2	<2	<2
Hexachlorobutadiene	0.384	2	<2	<2	<2	<2
Hexachlorocyclopentadiene	0.322	2	<2	<2	<2	<2
Hexachloroethane	0.31	2	<2	<2	<2	<2
Indeno[*1,2,3-c,d*]pyrene	0.553	2	<2	<2	<2	<2
Isophorone	0.372	2	<2	<2	<2	<2
N-Nitrosodi-*n*-propylamine	0.397	2	<2	<2	<2	<2
N-Nitrosodimethylamine	0.316	2	<2	<2	<2	<2
N-Nitrosodiphenylamine	0.424	2	<2	<2	<2	<2
Nitrobenzene	0.376	2	<2	<2	<2	<2

Table 8-75. Fourth quarter(a) analytical results for constituents of concern not listed in WDR 96-248 and occurring in Site 300 ground water beneath surface impoundments (concluded).

Parameter	MDL(b)	RL(c)	Location			
			W-817-01	W-817-02	W-817-03	W-817-04
Semivolatile organic compounds (µg/L) (cont'd)						
Pentachlorophenol	1.841	10	<10	<10	<10	<10
Phenanthrene	0.449	2	<2	<2	<2	<2
Phenol	0.209	2	<2	<2	<2	<2
Pyrene	0.554	2	<2	<2	<2	<2
p,p'-DDD	0.644	2	<2	<2	<2	<2
p,p'-DDE	0.714	3	<3	<3	<3	<3
p,p'-DDT	0.644	2	<2	<2	<2	<2
Energetic materials (µg/L)						
1,3,5-Trinitrobenzene	0.04	0.45	<0.45	<0.45	<0.45	<0.45
1,3-Dinitrobenzene	0.03	0.3	<0.3	<0.3	<0.3	<0.3
2,4-Dinitrotoluene	0.11	0.26	<0.26	<0.26	<0.26	0.62
2,6-Dinitrotoluene	0.07	0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-dinitrotoluene	0.04	0.26	0.19 est	<0.26	0.66	0.26
4-Amino-2,6-dinitrotoluene	0.05	0.26	15	<0.26	<0.26	<0.26
2-Nitrotoluene	0.03	0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	0.02	0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	0.03	0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	0.04	0.5	<0.5	<0.5	<0.5	<0.5
Tetryl	0.04	1	<1	<1	<1	<1

a Dates sampled: 10/6/97–0/28/97.

b MDL = Method detection limit.

c RL = Reporting limit = Practical quantitation limit (PQL) for BC and for LAS, Inc. Analyses for energetic materials were performed by LAS, Inc.; all other analyses were performed by BC Laboratories, Inc.

d NA = Not applicable.

e Sample values followed by an "est" have values between the method detection limit and the reporting limit for that compound.

Table 8-76. Analysis of photographic process wastewater effluent from Site 300 Building 801, R301.

Analyte	WDR effluent limits[(a)]	MDL[(b)]	Date 3/4/97 Result	3/4/97 Analytical reporting limit	5/21/97 Result	5/21/97 Analytical reporting limit	10/3/97 Result	10/3/97 Analytical reporting limit
Metals (mg/L)								
Aluminum	none	0.048	0.12	0.05	na [(c)]	NA[(d)]	na	NA
Antimony	15[(e)]	0.00063	0.00082 est[(f)]	0.004	0.001 est	0.004	0.00074 est	0.005
Arsenic	5	0.00068	nd [(g)]	0.002	nd	0.002	nd	0.002
Barium	100	0.0026	0.014 est	0.025	0.016 est	0.025	0.013 est	0.025
Beryllium	0.75[(e)]	0.000071	nd	0.0002	nd	0.0002	nd	0.0002
Boron	none	0.0031	1.6	0.05	na	NA	na	NA
Cadmium	1	0.000046	0.0058	0.0005	0.0043	0.001	0.0044	0.0005
Chromium	5	0.00003	0.0025	0.001	0.0034	0.001	0.0015	0.001
Cobalt	80	0.0043	nd	0.05	nd	0.05	nd	0.05
Copper	25	0.00008	0.1	0.001	0.104	0.001	0.039	0.001
Iron	none	0.0056	1.4	0.05	na	NA	na	NA
Lead	5	0.00033	0.0088	0.005	0.021	0.005	0.024	0.005
Manganese	none	0.0011	0.11	0.01	0.057	0.01	0.057	0.01
Mercury	0.2[(d)]	0.0001	nd	0.0002	na	NA	na	NA
Molybdenum	350	0.0039	0.014 est	0.025	0.016 est	0.05	0.024 est	0.025
Nickel	20	0.00055	0.025	0.002	0.012	0.01	0.0077	0.002
Potassium	none		na	NA	17.6	1	23	1
Selenium	1[(e)]	0.00058	nd	0.005	nd	0.005	na	NA
Silver	5	0.0048	0.032	0.001	1.07	0.2	0.367	0.1
Thallium	7[(e)]	0.00026	nd	0.001	nd	0.001	nd	0.001
Vanadium	24[(e)]	0.0031	nd	0.01	nd	0.01	nd	0.01
Zinc	250	0.0033	8	0.02	3.6	0.05	3.5	0.02
Semivolatile organic compounds (mg/L)								
Bis(2-ethylhexyl)phthalate	1000	0.000673	0.00337 est	0.005	2.6 est	0.005	nd	0.005
Butylbenzylphthalate	1000	0.000485	nd	0.002	nd	0.002	nd	0.002
Di-*n*-octylphthalate	1000	0.000635	nd	0.002	nd	0.002	nd	0.002
Dibutylphthalate	1000	0.000493	nd	0.002	nd	0.002	nd	0.002
Diethylphthalate	1000	0.000437	0.00075 est	0.002	nd	0.002	nd	0.002
m- and *p*-Cresol	50	na	na	NA	na	NA	na	NA
Naphthalene	200	0.000394	0.00053 est	0.002	nd	0.002	nd	0.002

Table 8-76. Analysis of photographic process wastewater effluent from Site 300 Building 801, R301 (concluded).

Analyte	WDR effluent limits[(a)]	MDL[(b)]	Date					
			3/4/97		5/21/97		10/3/97	
			Result	Analytical reporting limit	Result	Analytical reporting limit	Result	Analytical reporting limit
Semivolatile organic compounds (mg/L) (cont'd)								
o-Cresol	50	0.000414	nd	0.002	nd	0.002	nd	0.002
p-Cresol	50	0.000379	nd	0.004	nd	0.002	nd	0.002
General								
pH (pH units)	2–12.5		7.33		7.35		7.63	

[a] These discharge limits come from either WDR No. 96-248, or from Appendix C of the *Amended Report of Waste Discharge* (1995).

[b] MDL = Method detection limit.

[c] na = Not analyzed.

[d] NA = Not applicable.

[e] California soluble threshold limit concentration (STLC), i.e., California hazardous waste limit not noted in WDR 96-248.

[f] Analyte concentrations between the MDL and the analytical reporting limit can only be estimated.

[g] nd = Analyte not detected above its MDL.

Table 8-77. Analysis of photographic process wastewater effluent from Site 300 Building 823, R1U1.

Analyte	WDR effluent limits[(a)]	MDL[(b)]	Date 1/10/97 Result	1/10/97 Analytical reporting limit	5/2/97 Result	5/2/97 Analytical reporting limit	9/17/97 Result	9/17/97 Analytical reporting limit	12/18/97 Result	12/18/97 Analytical reporting limit
Metals (mg/L)										
Aluminum	none	0.0064	0.17	0.05	na[(c)]	NA[(d)]	na	NA	na	NA
Antimony	15[(e)]	0.00063	nd[(f)]	0.01	0.00145[(g)] est	0.004	0.00096 est	0.004	nd	0.005
Arsenic	5	0.00068	nd	0.002	0.00154 est	0.002	na	NA	nd	0.004
Barium	100	0.0019–0.0026	0.013 est	0.025	0.0102 est	0.025	0.015est	0.1	0.013 est	0.025
Beryllium	0.75[(e)]	0.000071	nd	0.0002	nd	0.0002	nd	0.0002	nd	0.0002
Boron	none	0.0031	0.94	0.05	na	NA	na	NA	na	NA
Cadmium	1	0.000046	0.0011	0.0005	0.0039	0.0005	0.000246 est	0.001	0.001	0.0005
Chromium	5	0.00003	0.0008 est	0.001	0.00055 est	0.001	0.0019	0.001	0.0016	0.001
Cobalt	80	0.0027–0.0043	nd	0.05	nd	0.05	nd	0.05	nd	0.05
Copper	25	0.00008	0.016	0.001	0.017	0.001	0.013	0.001	0.03	0.005
Iron	none	0.0056	0.35	0.05	na	NA	na	NA	na	NA
Lead	5	0.00033	0.008	0.005	0.00059 est	0.005	0.00227 est	0.005	0.0038 est	0.005
Manganese	none	0.0011	0.0037 est	0.01	0.0055 est	0.01	0.0096 est	0.01	0.012	0.01
Mercury	0.2[(e)]	0.0001	nd	0.0002	na	NA	na	NA	na	NA
Molybdenum	350	0.0037–0.0039	0.0175 est	0.025	0.016 est	0.05	0.025 est	0.05	0.022 est	0.025
Nickel	20	0.00055	0.00087 est	0.002	0.00173 est	0.002	0.0028 est	0.01	0.0028	0.002
Potassium	none		6.4	0.1	12.1	0.1	8.4	1	8	1
Selenium	1[(e)]	0.00058	nd	0.05	nd	0.005	na	NA	na	NA
Silver	5	0.0002–0.0048	0.036	0.001	0.31	0.01	0.028	0.001	0.033	0.002
Thallium	7[(e)]	0.00026	0.00052 est	0.001	nd	0.001	nd	0.001	nd	0.002
Vanadium	24[(e)]	0.0022–0.0031	nd	0.01	nd	0.01	nd	0.01	nd	0.01
Zinc	250	0.002–0.0033	0.058	0.02	0.053	0.02	0.015 est	0.05	1.4	0.02

Table 8-77. Analysis of photographic process wastewater effluent from Site 300 Building 823, R1U1 (concluded).

Analyte	WDR effluent limits[(a)]	MDL[(b)]	Date							
			1/10/97		5/2/97		9/17/97		12/18/97	
			Result	Analytical reporting limit	Result	Analytical reporting limit	Result	Analytical reporting limit	Result	Analytical reporting limit
Semivolatile organic compounds (mg/L)										
Bis(2-ethylhexyl)phthalate	1000	0.000673	0.00097 est	0.005	0.002 est	0.005	0.045	0.005	0.076	0.005
Butylbenzylphthalate	1000	0.000485	0.0028	0.002	nd	0.002	0.0075	0.002	0.005	0.002
Di-*n*-octylphthalate	1000	0.000635	nd	0.002	nd	0.002	nd	0.002	nd	0.002
Dibutylphthalate	1000	0.000493	nd	0.002	nd	0.002	nd	0.002	0.510	0.002
Diethylphthalate	1000	0.000437	nd	0.002	nd	0.002	nd	0.002	0.0021	0.002
m- and *p*-Cresol	50	0.000379	nd	0.002	na	NA	na	NA	na	NA
Naphthalene	200	0.000394	nd	0.002	nd	0.002	nd	0.002	nd	0.002
o-Cresol	50	0.000414	nd	0.002	nd	0.002	nd	0.002	nd	0.002
p-Cresol	50	0.000379	nd	0.002	nd	0.002	nd	0.002	nd	0.002
General										
pH (pH units)	2–12.5	0	8.71	0	7.96	0	8.3	0	7.7	0

a These discharge limits come from either WDR No. 96-248, or from Appendix C of the *Amended Report of Waste Discharge* (1995).

b MDL = Method detection limit.

c na = Not analyzed.

d NA = Not applicable.

e California soluble threshold limit concentration (STLC), i.e., California hazardous waste limit not noted in WDR 96-248.

f nd = Analyte not detected above its MDL.

g Analyte concentrations between the MDL and the analytical reporting limit can only be estimated.

Table 8-78. Analysis of photographic process wastewater effluent from Site 300 Building 851, R1A1.

Analyte	WDR effluent limits[(a)]	MDL[(b)]	Date			
			1/28/97		9/3/97	
			Result	Analytical reporting limit	Result	Analytical reporting limit
Metals (mg/L)						
Aluminum	none	0.0064	0.38	0.05	na[(c)]	NA[(d)]
Antimony	15[(e)]	0.00063	nd[(f)]	0.004	nd	0.005
Arsenic	5	0.00068	nd	0.002	na	NA
Barium	100	0.0019 – 0.002	nd	0.025	nd	0.025
Beryllium	0.75[(e)]	0.000071	nd	0.0002	nd	0.0002
Boron	none	0.0045	0.94	0.05	na	NA
Cadmium	1	0.000046	nd	0.0005	nd	0.0005
Chromium	5	0.00003	0.047	0.001	0.206	0.02
Cobalt	80	0.0027–0.0037	nd	0.05	nd	0.05
Copper	25	0.00008	0.16	0.001	0.151	0.01
Iron	none	0.017	3.7	0.05	na	NA
Lead	5	0.00033	nd	0.005	0.0057	0.005
Manganese	none	0.0011	0.059	0.01	0.015	0.01
Mercury	0.2[(e)]	0.0001	nd	0.0002	na	NA
Molybdenum	350	0.0037–0.0046	nd	0.025	nd	0.025
Nickel	20	0.00055	0.015	0.002	0.029	0.002
Potassium	none	0.099–0.13	20	1	20	1
Selenium	1[(e)]	0.00058	nd	0.002	na	NA
Silver	5	0.0002–0.0048	0.16	0.001	0.056	0.01
Thallium	7[(e)]	0.00026	nd	0.001	nd	0.001
Vanadium	24[(e)]	0.0022–0.0054	nd	0.01	nd	0.01
Zinc	250	0.002–0.004	0.16	0.02	0.072	0.02
Semivolatile organic compounds (mg/L)						
Bis(2-ethylhexyl)phthalate	1000	0.000673	0.0017 est[(g)]	0.005	nd	0.005
Butylbenzylphthalate	1000	0.000485	nd	0.002	nd	0.002
Di-*n*-octylphthalate	1000	0.000635	nd	0.002	nd	0.002
Dibutylphthalate	1000	0.000493	nd	0.002	nd	0.002
Diethylphthalate	1000	0.000437	nd	0.002	nd	0.002
m- and *p*-Cresol	50	0.000379	nd	0.002	na	NA
Naphthalene	200	0.000394	nd	0.002	nd	0.002

Table 8-78. Analysis of photographic process wastewater effluent from Site 300 Building 851, R1A1 (concluded).

Analyte	WDR effluent limits[a]	MDL[b]	Date			
			1/28/97		9/3/97	
			Result	Analytical reporting limit	Result	Analytical reporting limit
Semivolatile organic compounds (mg/L) (cont'd)						
o-Cresol	50	0.000414	nd	0.002	nd	0.002
p-Cresol	50	0.000379	nd	0.002	nd	0.002
General						
pH (pH units)	2–12.5		7.65		8.22	

a These discharge limits come from either WDR No. 96-248, or from Appendix C of the *Amended Report of Waste Discharge* (1995).

b MDL = Method detection limit.

c na = Not analyzed.

d NA = Not applicable.

e California soluble threshold limit concentration (STLC), i.e., California hazardous waste limit not noted in WDR 96-248.

f nd = Analyte not detected above its MDL.

g Analyte concentrations between the MDL and the analytical reporting limit can only be estimated.

Table 8-79. Analysis of chemistry process wastewater effluent, Site 300, 1997.

Analyte	Location and date							
	825-BAKER 5/7/97		827A-R1A1 3/12/97		827C-R1A1 5/7/97		827E-R2A1 2/13/97	
	Result	Reporting limit	Result	Reporting limit	Result	Reporting limit	Result	Reporting limit
Metals (mg/L)								
Antimony	nd[(a)]	0.1	nd	0.3	nd	0.5	nd	0.05
Arsenic	nd	0.2	nd	0.5	nd	1	nd	0.1
Barium	0.04	0.004	0.09	0.01	0.2	0.02	0.43	0.002
Beryllium	nd	0.002	nd	0.005	nd	0.01	nd	0.001
Cadmium	nd	0.01	nd	0.03	nd	0.05	nd	0.005
Chromium	0.01	0.01	nd	0.03	0.08	0.05	nd	0.005
Cobalt	nd	0.01	nd	0.03	nd	0.05	nd	0.005
Copper	0.03	0.01	0.08	0.03	0.3	0.05	0.12	0.005
Lead	nd	0.04	0.2	0.1	nd	0.2	nd	0.02
Mercury							0.002	0.002
Molybdenum	nd	0.02	0.05	0.04	nd	0.08	0.02	0.008
Nickel	nd	0.04	0.2	0.1	nd	0.2	0.02	0.02
Potassium	4	0.4	11	1	4	2	9.4	0.2
Selenium	nd	0.1	nd	0.3	nd	0.5	nd	0.05
Silver	nd	0.02	nd	0.05	nd	0.1	nd	0.01
Thallium	nd	0.2	nd	0.5	nd	1	nd	0.1
Uranium	nd	0.6	nd	2	nd	3	nd	0.3
Vanadium	nd	0.04	nd	0.1	nd	0.2	nd	0.02
Zinc	0.05	0.02	1.1	0.05	1	0.1	0.91	0.01

[a] nd = Not detected.

Table 8-80. Second quarter analytical results for WDR 96-248 constituents of concern in ground water beneath Site 300 sewage ponds.[a]

Monitoring well	Biological parameters[b]		Minerals (mg/L)	General parameters	
	Fecal coliform (MPN/100 mL)[c]	Total coliform (MPN/100 mL)[c]	Nitrate (as NO_3)	pH (pH units)	Specific conductance (μmho/cm)
W-7E	<1.1	<1.1	<0.4	8.53	1530
W-7ES	<1.1	<1.1	6.2	7.82	1200
W-7DS	<1.1	<1.1	8.0	8.55	1180
W-7PS	<1.1	<1.1	12.0	7.65	1310
W-25N-20	<1.1	<1.1	8.4	7.72	1180
W-26R-01	<1.1	<1.1	24.8	7.76	1420
W-26R-05	<1.1	<1.1	12.0	7.88	1280
W-26R-11	<1.1	<1.1	10.2	7.76	1240
W-35A-04	<1.1	<1.1	10.02	8.56	1250

a Samples collected from 4/28/97–5/7/97.

b WDR limit = 2.2 MPN/100 L.

c Coliform measurements are in terms of “most probable number” (MPN) of organisms/100 mL of sample.

Table 8-81. Fourth quarter analytical results for WDR 96-248 constituents of concern in ground water beneath Site 300 sewage ponds.[a]

Monitoring well	Biological parameters[b]		Minerals (mg/L)	General parameters	
	Fecal coliform (MPN/100 mL)[c]	Total coliform (MPN/100 mL)[c]	Nitrate (as NO_3)	pH (pH units)	Specific conductance (μmho/cm)
W-7E	<1.1	<1.1	<0.4	8.48	1530
W-7ES	<1.1	<1.1	6.6	7.64	1350
W-7DS	<1.1	<1.1	7.1	7.53	1340
W-7PS	<1.1	<1.1	14.0	9.55	1420
W-25N-20	<1.1	<1.1	8.0	7.61	1340
W-26R-01	<1.1	<1.1	49	7.68	1490
W-26R-05	<1.1	<1.1	2.3	7.95	1180
W-26R-11	<1.1	<1.1	8.9	7.53	1360
W-35A-04	<1.1	<1.1	9.7	7.71	1360

a Samples collected from 11/3/97–11/19/97.

b WDR limit = 2.2 MPN/100 L.

c Coliform measurements are in terms of “most probable number” (MPN) of organisms/100 mL of sample.

Table 8-82. Leachable organic compounds in Livermore site sediments, July 29–31, 1997.

Analyte (mg/L)	ALPE 30-Jul	ASS2 31-Jul	ASW 31-Jul	CDB 31-Jul	ESB 29-Jul	GRNE 30-Jul
1,1-Dichloroethene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,2-Dichloroethane	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,4-Dichlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-Butanone	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Carbon tetrachloride	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chloroform	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tetrachloroethene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Trichloroethene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Vinyl chloride	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Table 8-83. Total metals in Livermore site sediments, July 29–31, 1997.

Analyte (mg/kg)	ALPE	ASS2	ASW	CDB	ESB	GRNE
Antimony	<5.9	<7.6	<5.9	<7.1	<6.6	<6.4
Arsenic	3.12	2.98	4.23	5.2	4.81	4.27
Barium	162	88.5	85.2	222	168	310
Beryllium	<0.49	<0.63	<0.49	<0.6	<0.55	<0.54
Cadmium	<0.49	<0.63	0.646	<0.6	<0.55	<0.54
Chromium	24.3	16.7	22.2	52.2	54.4	23.1
Cobalt	7.63	<6.3	6.64	10.4	9.95	9.23
Copper	14.2	8.39	15.8	19.1	18.2	9.65
Lead	26	5.21	7.53	7.71	6.37	17.3
Mercury	<0.097	<0.11	<0.099	<0.11	<0.11	<0.1
Molybdenum	<20	<25	<20	<24	<22	<21
Nickel	40.9	23.5	33.4	45.6	49.1	26.6
Potassium	1130	1410	1400	2690	1780	1440
Selenium	<0.49	<0.63	<0.49	0.822	<0.55	<0.54
Silver	1.1	<1.3	<0.99	<1.2	<1.1	<1.1
Thallium	<0.98	<1.3	<0.99	<1.2	<1.1	<1.1
Vanadium	21.8	16.4	22.8	40.1	31.4	34.1
Zinc	68.2	33.2	132	49.4	45.3	40.7

Table 8-84. Soluble metals in Livermore site sediments, July 29–31, 1997.

Analyte (mg/L)	ALPE	ASS2	ASW	CDB	GRNE
Antimony	<0.6	<0.6	<0.6	<0.6	<0.6
Arsenic	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	5.38	3.28	6.92	8.82	10.3
Beryllium	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	<0.5	<0.5	<0.5	<0.5	<0.5
Copper	<0.25	<0.25	<0.25	<0.25	<0.25
Lead	1.07	0.0743	0.105	0.0477	0.189
Mercury	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum	<2	<2	<2	<2	<2
Nickel	0.488	<0.4	<0.4	0.643	0.521
Potassium	<50	<50	<50	<50	<50
Selenium	0.0517	<0.05	<0.05	<0.05	<0.05
Silver	<0.1	<0.1	<0.1	<0.1	<0.1
Thallium	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	2.15	0.776	8.18	0.233	<0.2

9

Soil and Sediment Monitoring

Gretchen M. Gallegos

Soil Methods

Prior to 1988, soil samples were collected at sites selected at random from Livermore Valley locations previously sampled for a 1971–1972 study. That earlier study was conducted to determine background concentrations of radionuclides in area soils. In 1988, Livermore Valley surveillance soil sampling locations were chosen to coincide with air sampling locations or to give coverage to areas with contaminants from past incidents or of other special concern. In 1991, five additional soil sampling locations associated with air sampling locations were established. The 1997 Livermore site soil samples were collected from generally the same locations as those in 1991 to 1996. A few changes were made to the sampling locations due to accessibility and other considerations. Soil sampling locations RRCH, ALTA, and ERCH were also removed from the sampling program due to problems with accessibiliy stemming from the private ownership of the property where the samples were taken. Soil sampling locations CHUR and AMON are replacement locations for RRCH and ALTA. Soil sampling location ERCH was not replaced; it was a background location, as was RRCH (which was replaced), and sufficient background samples are obtained with the other locations. Soil sampling location CAFE was removed from the sampling program because the location did not meet the requirement of being unsheltered by trees or buildings; it also was near a heavily traveled area. This location was not replaced because there are other perimeter samples which provide similar data. The 1997 Site 300 soil samples were collected from the same 14 sampling locations as in 1990 to 1996; however, analysis for plutonium in Site 300 soils was discontinued in 1997 because plutonium has not been used at the site and sample results have continuously been at background levels since sampling was begun in 1972. The use of constant sampling locations is preferred, when possible, from year to year because it allows more meaningful trending of data.

Sampling locations at areas with known or suspected contaminants were monitored to delimit the extent of the contaminants and to track the contaminants from year to year. For example, six soil sampling locations were located near the Livermore Water Reclamation Plant (LWRP) to monitor soils that contain slightly elevated plutonium levels originating from accidental releases to the sewer, from 1967 and earlier years.

Soil sampling is conducted according to written, standardized procedures contained in the *Environmental Monitoring Plan* (Tate et al. 1995). Samples are collected from undisturbed areas near the permanent sampling location marker. These areas generally are level, free of rocks, and are unsheltered by trees or buildings. The sampling technician chooses two 1 m squares from which to collect the sample and records how far away and in what direction from the permanent marker the sample is collected. Each sample is a composite consisting of 10 subsamples that are collected with an 8.25-cm-diameter stainless steel core sampler at the corners and the center of each square. All subsamples are collected from the top 5 cm of soil because surface deposition from the air is the primary pathway for potential contamination.

Quality assurance (QA) samples are submitted with each batch of soil samples. Two identical samples are collected and, at locations chosen for duplicate sampling, adjacent cores are collected from the corners and center of the sampling squares. Separate composites of 10 cores each are made, and the duplicate samples are identified with unique sample identifier codes.

Samples are delivered to LLNL's Chemistry and Materials Science Environmental Services (CES) laboratory for analyses. Soil samples are dried, ground, sieved, and blended. The plutonium content of a sample aliquot is determined by alpha spectroscopy (Hall and Edwards 1994c). Other sample aliquots (300 g) are analyzed for more than 150 radionuclides by gamma spectroscopy, using a high-purity germanium (HPGe) detector (Hall and Edwards 1994a, b, and c). The 10-g subsamples of samples from Site 300 are sent to a contract analytical laboratory and are analyzed by graphite-furnace atomic absorption spectroscopy for beryllium. Chain-of-custody procedures are followed throughout the sampling, delivery, and analytical processes.

Sediment Methods

Samples of recent sediment are collected annually from drainages at and around the Livermore site after the cessation of spring runoff. For 1997, samples were analyzed for radionuclides and nonradiological materials (see Chapter 8).

Sediment was sampled from seven Livermore site drainages. Location ALPO was covered in water throughout the sampling period, and was not sampled. The sediment sampling locations coincide with storm water runoff sampling locations so it would be possible to compare the sampling results from these two media.

A culvert, bridge, or other permanent marker serves as a reference point for each sampling location. Ten subsamples, 5-cm deep, are collected at 1-m intervals along a transect of the arroyo or drainage channel. At one of the subsample locations, a 15-cm deep sample is acquired for tritium analysis. The sample collection technicians record how far away and in what direction from the permanent marker the samples are actually collected. As with soils samples, QA samples are submitted with each batch of sediment samples.

Samples are delivered to LLNL's CES laboratory for analysis. For samples collected for tritium analyses, CES uses freeze-drying techniques to recover water from the samples and determines the tritium content of the water by liquid-scintillation counting. The plutonium content of a sample aliquot is determined by alpha spectroscopy. Other sample aliquots are analyzed for more than 150 radionuclides using gamma spectroscopy as described above for soil samples. The radioanalytical methods employed by the CES laboratory enable detection of concentrations at levels far more sensitive than regulatory limits. Chain-of-custody procedures are followed throughout the sampling, delivery, and analytical processes.

Data

Table 9-1 presents the analytical data for radionuclides and beryllium for soils and sediments samples collected in 1997. The data generally reflect historic data values for these analytes at these locations. A detailed discussion of these results is provided in the main volume of this report.

Table 9-1. Radionuclides and beryllium in soils and sediments, 1997.

Location identifier	Plutonium-238 (µBq/g)	Plutonium-239/240 (µBq/g)	Americium-241 (mBq/g)	Cesium-137 (mBq/g)	Potassium-40 (Bq/g)
Livermore Valley soils					
L-AMON-SO	4.2 ± 2.9	75 ± 10	__[(a)]	2.49 ± 0.26	0.581 ± 0.028
L-CHUR-SO	6.7 ± 3.1	158 ± 16	__[(a)]	5.55 ± 0.23	0.537 ± 0.015
L-COW-SO	<2.3 ± 3.0	61 ± 9	__[(a)]	<0.10	0.496 ± 0.014
L-FCC-SO	13.8 ± 5.3	77 ± 11	__[(a)]	2.92 ± 0.20	0.411 ± 0.012
L-HOSP-SO	6.8 ± 3.5	19 ± 5	__[(a)]	1.98 ± 0.19	0.463 ± 0.013
L-MESQ-SO	7.3 ± 4.3	43 ± 8	__[(a)]	1.33 ± 0.18	0.544 ± 0.019
L-MET-SO	≤0.03 ± 2.3	45 ± 7	__[(a)]	1.79 ± 0.22	0.596 ± 0.017
L-NEP-SO	<1.1 ± 2.7	53 ± 8	__[(a)]	1.35 ± 0.23	0.474 ± 0.011
L-PATT-SO	5.5 ± 2.7	26 ± 5	__[(a)]	0.84 ± 0.19	0.537 ± 0.019
L-SALV-SO	17.6 ± 4.5	344 ± 30	__[(a)]	3.21 ± 0.27	0.414 ± 0.012
L-TANK-SO	9.3 ± 3.4	64 ± 9	__[(a)]	2.06 ± 0.14	0.350 ± 0.010
L-VIS-SO	38.5 ± 6.5	559 ± 46	__[(a)]	1.14 ± 0.20	0.396 ± 0.012
L-ZON7-SO	15.5 ± 4.4	151 ± 16	__[(a)]	4.63 ± 0.31	0.488 ± 0.017
Median	**6.8**	**64**		**1.98**	**0.488**
Interquartile range	**9.7**	**106**		**1.59**	**0.122**
Maximum	**38.5**	**559**		**5.55**	**0.596**
LWRP soils					
L-WRP1-SO	389 ± 33	8070 ± 590	3.0 ± 0.7	3.53 ± 0.24	0.400 ± 0.013
L-WRP2-SO	306 ± 27	4400 ± 320	5.3 ± 3.3	4.14 ± 0.26	0.418 ± 0.012
L-WRP3-SO	253 ± 23	4660 ± 340	<2.2	2.97 ± 0.23	0.400 ± 0.013
L-WRP4-SO	23 ± 6	440 ± 40	<1.3	0.51 ± 0.15	0.345 ± 0.017
L-WRP5-SO	191 ± 24	3600 ± 290	<3.0	1.70 ± 0.21	0.451 ± 0.018
L-WRP6-SO	83 ± 10	1490 ± 110	<0.8	0.90 ± 0.27	0.429 ± 0.011
Median	**222**	**4000**	**<2.6**	**2.33**	**0.409**
Interquartile range	**183**	**2577**	__[(g)]	**2.29**	**0.027**
Maximum	**389**	**8070**	**5.3**	**4.14**	**0.451**
Livermore site sediments					
L-ALPE-SD	<2.7 ± 3.3	20 ± 5	__[(a)]	0.37 ± 0.15	0.411 ± 0.011
L-ASS2-SD	<2.8 ± 2.9	8.3 ± 3.0	__[(a)]	<0.10	0.470 ± 0.011
L-ASW-SD	6.3 ± 3.1	16 ± 4	__[(a)]	0.36 ± 0.13	0.503 ± 0.014
L-CDB-SD	56.6 ± 8.2	688 ± 55	__[(a)]	0.73 ± 0.27	0.451 ± 0.014
L-ESB-SD	210 ± 20.	1930 ± 140	__[(a)]	0.97 ± 0.17	0.440 ± 0.014
L-GRNE-SD	8.1 ± 3.0	74 ± 9	__[(a)]	1.24 ± 0.16	0.451 ± 0.017
L-WPDC-SD	6.4 ± 3.3	17 ± 4	__[(a)]	0.21 ± 0.13	0.488 ± 0.015
Median	**6.4**	**20**		**0.37**	**0.451**
Interquartile range	**27.8**	**364**		**0.57**	**0.033**
Maximum	**210**	**1930**		**1.24**	**0.503**

Tritium (Bq/L)	Thorium-232[c] (µg/g)	Uranium-235[d] (µg/g)	Uranium-238[e] (µg/g)	Beryllium[f] (mg/kg)	Uranium 235/238
		Livermore Valley soils			
__[b]	8.1 ± 0.2	0.023 ± 0.011	3.1 ± 1.3	__[f]	0.0073
__[b]	7.7 ± 0.2	0.023 ± 0.008	2.4 ± 1.1	__[f]	0.0095
__[b]	6.9 ± 0.2	<0.017	1.6 ± 1.0	__[f]	0.0106
__[b]	5.8 ± 0.2	0.020 ± 0.009	1.8 ± 0.5	__[f]	0.0110
__[b]	3.0 ± 0.1	0.011 ± 0.007	1.2 ± 0.8	__[f]	0.0091
__[b]	6.9 ± 0.2	<0.018	2.7 ± 2.2	__[f]	0.0068
__[b]	7.2 ± 0.2	0.022 ± 0.009	3.1 ± 2.5	__[f]	0.0071
__[b]	6.1 ± 0.2	0.018 ± 0.009	2.3 ± 1.5	__[f]	0.0079
__[b]	7.4 ± 0.3	0.023 ± 0.011	2.1 ± 1.6	__[f]	0.0110
__[b]	6.4 ± 0.2	0.016 ± 0.016	1.9 ± 1.3	__[f]	0.0089
__[b]	5.7 ± 0.3	0.019 ± 0.009	2.3 ± 1.4	__[f]	0.0084
__[b]	6.3 ± 0.3	0.024 ± 0.007	2.0 ± 1.6	__[f]	0.0119
__[b]	7.7 ± 0.2	0.020 ± 0.009	1.9 ± 1.4	__[f]	0.0108
	6.9	**0.020**	**2.1**		
	1.3	**__[g]**	**0.5**		
	8.1	**0.024**	**3.1**		
		LWRP soils			
__[b]	7.2 ± 0.2	0.025 ± 0.015	2.8 ± 1.8	__[f]	0.0091
__[b]	7.1 ± 0.2	0.023 ± 0.010	1.9 ± 1.1	__[f]	0.0120
__[b]	7.2 ± 0.2	0.019 ± 0.009	2.0 ± 1.6	__[f]	0.0095
__[b]	6.3 ± 0.2	0.017 ± 0.008	2.0 ± 1.5	__[f]	0.0085
__[b]	6.6 ± 0.2	0.019 ± 0.007	2.3 ± 1.4	__[f]	0.0084
__[b]	6.8 ± 0.2	0.017 ± 0.010	2.2 ± 1.2	__[f]	0.0076
	6.9	**0.019**	**2.1**		
	0.5	**0.004**	**0.2**		
	7.2	**0.025**	**2.8**		
		Livermore site sediments			
12.8 ± 3.0	4.7 ± 0.1	0.015 ± 0.011	1.2 ± 1.2	__[f]	0.0123
<1.2	3.6 ± 0.1	0.011 ± 0.006	1.2 ± 0.9	__[f]	0.0085
<2.1	4.5 ± 0.1	<0.014	2.0 ± 1.3	__[f]	0.0069
36.4 ± 2.4	6.7 ± 0.2	0.023 ± 0.009	2.1 ± 1.1	__[f]	0.0108
61.1 ± 3.1	7.7 ± 0.2	0.024 ± 0.011	2.3 ± 1.5	__[f]	0.0103
3.7 ± 1.4	5.3 ± 0.2	0.018 ± 0.009	1.9 ± 1.5	__[f]	0.0094
12.5 ± 1.7	5.2 ± 0.2	<0.019	2.0 ± 1.1	__[f]	0.010
12.5	**5.2**	**0.018**	**2.0**		
21.7	**1.4**	**__[g]**	**0.5**		
61.1	**7.7**	**0.024**	**2.3**		

Table 9-1. Radionuclides and beryllium in soils and sediments, 1997 (concluded).

Location identifier	Plutonium-238 (µBq/g)	Plutonium-239/240 (µBq/g)	Americium-241 (mBq/g)	Cesium-137 (mBq/g)	Potassium-40 (Bq/ g)
Site 300 soils					
3-801E-SO	__(i)	__(i)	__(a)	1.54 ± 0.20	0.437 ± 0.015
3-801N-SO	__(i)	__(i)	__(a)	1.18 ± 0.22	0.485 ± 0.016
3-801W-SO	__(i)	__(i)	__(a)	1.37 ± 0.26	0.437 ± 0.012
3-812N-SO	__(i)	__(i)	__(a)	1.27 ± 0.16	0.381 ± 0.016
3-812N-SO(h)	__(i)	__(i)	__(a)	0.56 ± 0.24	0.400 ± 0.021
3-834W-SO	__(i)	__(i)	__(a)	2.22 ± 0.18	0.444 ± 0.012
3-851N-SO	__(i)	__(i)	__(a)	3.00 ± 0.28	0.422 ± 0.018
3-851N-SO(h)	__(i)	__(i)	__(a)	3.01 ± 0.32	0.448 ± 0.017
3-856N-SO	__(i)	__(i)	__(a)	3.08 ± 0.21	0.396 ± 0.013
3-858S-SO	__(i)	__(i)	__(a)	1.98 ± 0.23	0.562 ± 0.012
3-DSW-SO	__(i)	__(i)	__(a)	4.59 ± 0.22	0.426 ± 0.020
3-EOBS-SO	__(i)	__(i)	__(a)	0.74 ± 0.15	0.488 ± 0.034
3-EVAP-SO	__(i)	__(i)	__(a)	0.30 ± 0.18	0.414 ± 0.012
3-GOLF-SO	__(i)	__(i)	__(a)	7.25 ± 0.29	0.581 ± 0.023
3-NPS-SO	__(i)	__(i)	__(a)	5.55 ± 0.31	0.607 ± 0.023
3-WOBS-SO	__(i)	__(i)	__(a)	6.22 ± 0.29	0.396 ± 0.017
Median				**2.10**	**0.437**
Interquartile range				**2.21**	**0.075**
Maximum				**7.25**	**0.607**

Note: Radionuclides with 100% error are reported as less than the measure value.

[a] Americium-241 only detected in LWRP samples.

[b] Tritium analysis is only conducted on sediment samples.

[c] Thorium-232 activities in Bq/dry g can be determined by dividing the weight in µg/dry g by 247.3, and pCi/dry g can be determined by dividing by 9.15.

[d] Uranium-235 activities in Bq/dry g can be determined by dividing the weight in µg/dry g by 12.5, and pCi/dry g can be determined by dividing by 0.463.

Tritium (Bq/L)	Thorium-232[c] (µg/g)	Uranium-235[d] (µg/g)	Uranium-238[e] (µg/g)	Beryllium[g] (mg/kg)	Uranium 235/238
Site 300 soils					
__[b]	8.9 ± 0.2	0.024 ± 0.005	2.0 ± 1.4	1.3	0.012
__[b]	8.9 ± 0.2	0.024 ± 0.005	4.6 ± 0.8	1.1	0.0053
__[b]	8.6 ± 0.2	0.024 ± 0.004	6.0 ± 1.4	0.98	0.0041
__[b]	8.7 ± 0.3	0.153 ± 0.008	71.3 ± 3.1	5	0.0022
__[b]	5.6 ± 0.2	0.051 ± 0.011	20.0 ± 2.2	__[j]	0.0026
__[b]	9.6 ± 0.3	0.027 ± 0.005	2.5 ± 1.3	1.9	0.0106
__[b]	11.1 ± 0.5	0.185 ± 0.011	71.3 ± 3.3	1.8	0.0026
__[b]	11.9 ± 0.3	0.030 ± 0.009	4.0 ± 0.9	__[j]	0.0076
__[b]	9.6 ± 0.2	0.022 ± 0.005	2.2 ± 0.6	1.3	0.0101
__[b]	9.4 ± 0.3	0.033 ± 0.006	2.5 ± 0.9	0.98	0.0131
__[b]	7.5 ± 0.3	0.033 ± 0.006	4.8 ± 0.7	0.96	0.0068
__[b]	9.1 ± 0.3	0.024 ± 0.006	2.3 ± 1.3	1.5	0.0103
__[b]	7.1 ± 0.3	0.026 ± 0.005	6.0 ± 2.4	0.63	0.0043
__[b]	8.8 ± 0.2	0.024 ± 0.006	2.9 ± 1.2	0.86	0.0085
__[b]	7.6 ± 0.2	0.022 ± 0.006	4.2 ± 2.4	0.87	0.0053
__[b]	7.2 ± 0.2	0.016 ± 0.004	2.0 ± 0.6	1.4	0.0077
	8.8	**0.025**	**4.1**	**1.2**	
	1.9	**0.009**	**3.5**	**0.5**	
	11.9	**0.185**	**71.3**	**5.0**	

e Uranium-238 activities in Bq/dry g can be determined by dividing the weight in µg/dry g by 80.3, and pCi/dry g can be determined by dividing by 2.97.

f Beryllium analysis is only conducted on soils sampled at Site 300; the analysis is a chemical, not a radiochemical analysis.

g Interquartile range could not be calculated.

h Resampling was conducted to investigate elevated levels of uranium. See main volume, Chapter 9.

i Plutonium is no longer sampled at Site 300.

j Resampling did not include beryllium.

10

Vegetation and Foodstuff Monitoring

Gretchen M. Gallegos
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Vegetation Sampling Methods

When obtaining vegetation samples, LLNL avoids frequently tilled or disturbed areas and locations near buildings or other obstructions. Areas with unusual wind, precipitation, or irrigation influences also are avoided. Practical considerations also temper the location selections. These include access during inclement weather, personnel safety in vehicle operation, vehicle parking, or sample collection requirements.

Sampling locations PIN1, PIN2, and PRIM were added in the fourth quarter of 1996. PIN1 and PIN2 were added to evaluate the emissions of tritium from a pine tree that is rooted in tritium contaminated soil (PIN2 is a tree that is not located in tritium contaminated soil). PRIM is located off site and downwind of Site 300. See Figures 10-1 and 10-2 (in the main volume of this report) for maps of vegetation sampling locations.

The selected areas are unshaded and exhibit native vegetation for much of the year. The routine vegetation sampling locations are designated with permanent location markers. Consistent use of the same general sampling locations allows for more meaningful trending of data and closer monitoring of areas of concern. For example, every year at Site 300, LLNL examines vegetation from areas where tritium is known to be present in the subsurface soil.

In 1997, vegetation samples usually consisted of the green leaves and green stems of annual grasses. Other herbaceous vegetation or even perennial vegetation was sampled if grasses were not available. Approximately 0.5 to 1 kg of vegetation was collected for analysis. Standard chain-of-custody procedures were followed (Tate et al. 1995).

Samples are delivered on the day of collection to LLNL's Chemistry and Materials Science Environmental Services laboratory and are kept frozen prior to processing. Water from the vegetation is collected using freeze-drying techniques (lyophilization), and the tritium content of the water is determined by liquid-scintillation counting.

Approximately 10% of the sites are sampled in duplicate to comply with quality assurance protocols. Duplicate samples are preserved, stored, processed, and analyzed with methods identical to those employed for all other samples.

Wine Sampling Methods

Wine samples were purchased in 750-mL to 1-L bottles. One wine from six of the eight non-Livermore, California, wine growing regions and one wine from four of the 13 European wine growing regions was purchased and submitted for tritium analyses. The selection of samples from all the wines available within a geographic area was random. Any estate wine from a designated area was considered representative of that area. The most recent vintages available were collected, with an equal mix of red and white wines. Approximately 10% of the total complement of wines was sampled in duplicate to comply with quality assurance protocols. Because of the importance of the wine sampling network, LLNL sampled and analyzed as many of the available Livermore Valley wines as possible. Twelve Livermore Valley estate wines not previously sampled were purchased and analyzed.

The wine samples were submitted for analysis unopened to prevent airborne tritium contamination. Chain-of-custody procedures were followed when delivering samples and throughout the analytical process. Wines were analyzed for tritium using ^{3}He mass spectrometry in the LLNL Isotope Sciences Division Noble Gas Mass Spectrometry Laboratory (Surano et al. 1991). LLNL used this highly sensitive method for the wine analysis to determine the small differences in the tritium content of the samples. Had less sensitive methods been used, such as those employed by commercial analytical laboratories, the tritium content of all samples would be near or below detection limits and no differences would be apparent.

Table 10-1. Tritium (in Bq/L) in vegetation, 1997.

	First quarter	Second quarter	Third quarter	Fourth quarter	Median	Inter-quartile range	Dose (µSv/y)	
							Median	Maximum
Sampling locations near Livermore site								
AQUE	2.4 ± 1.4	45.5 ± 2.5	10.2 ± 1.7	4.3 ± 1.1	7.3	15	0.035	0.22
VIS	11.6 ± 1.7	26.2 ± 2.1	16.2 ± 1.9	10.6 ± 1.5	14	7.4	0.067	0.13
NPER	3.9 ± 1.5	15.8 ± 1.8	10.0 ± 1.7	4.7 ± 1.3	7.4	6.9	0.035	0.08
MET	1.6 ± 1.4	3.9 ± 1.4	<1.3	6.5 ± 1.3	2.8	—[a]	0.013	0.03
MESQ	4.9 ± 1.5	1.7 ± 1.3	7.4 ± 1.6	6.2 ± 1.3	5.6	2.4	0.027	0.036
GARD	<1.4	<1.3	<1.3	5.7 ± 1.3	<1.3	—[a]	<0.006	0.027
Sampling locations at an intermediate distance from Livermore site								
PATT	<1.3	<1.3	<1.3	2.5 ± 1.2	1.3	—[a]	0.006	0.012
ZON7	3.3 ± 1.4	9.5 ± 2.0	9.3 ± 1.7	4.8 ± 1.3	7.1	4.9	0.034	0.046
I580	<1.4	3.7 ± 1.4	<1.3	3.4 ± 1.2	2.4	—[a]	0.011	0.018
TESW	2.5 ± 1.4	1.33 ± 1.32	<1.4	8.5 ± 1.4	1.9	—[a]	0.009	0.041
Sampling locations far from Livermore site								
FCC	<1.3	<1.3	<1.3	2.0 ± 1.2	<1.3	—[a]	<0.006	0.010
CAL	<1.3	<1.3	<1.3	7.4 ± 1.4	<1.3	—[a]	<0.006	0.035
PARK	<1.3	<1.3	<1.3	5.7 ± 1.3	<1.3	—[a]	<0.006	0.027
Sampling locations at Site 300								
CARN	<1.4	<1.2	<1.2	<1.0	<1.2	—[a]	<0.006	0.007
GOLF	<1.4	<1.3	<1.2	<1.1	<1.2	—[a]	<0.006	0.007
GEO	<1.5	<1.3	<1.2	<1.0	<1.3	—[a]	<0.006	0.007
DSW	<1.6	2.6 ± 2	1390 ± 13	<1.1	<2.1	—[a]	0.010	6.7
Resample			1800 ± 14					8.7
801E	<1.4	<1.3	<1.2	<1.0	<1.2	—[a]	<0.006	0.007
EVAP	4.6 ± 1.8	<1.3	15.8 ± 1.7	<1.0	<2.9	—[a]	<0.014	0.076
PRIM	<1.4	<1.3	<1.2	<1.0	<1.3	—[a]	<0.006	0.007

[a] Insufficient data to calculate interquartile range.

Table 10-2. Tritium (in Bq/L) in retail wine, 1997.[a]

Sample	Area of production		
	Livermore Valley	California	Europe
1	0.77 ± 0.20	0.36 ± 0.19	1.12 ± 0.22
2	1.56 ± 0.24	0.39 ± 0.19	1.48 ± 0.24
3	1.57 ± 0.24	0.46 ± 0.19	1.75 ± 0.25
4	1.86 ± 0.26	0.48 ± 0.19	3.29 ± 0.38
5	2.09 ± 0.28	0.64 ± 0.20	
6	2.31 ± 0.30	0.75 ± 0.20	
7	2.60 ± 0.32		
8	3.23 ± 0.37		
9	3.34 ± 0.38		
10	3.67 ± 0.41		
11	3.76 ± 0.42		
12	7.96 ± 0.82		
Median	**2.45**	**0.47**	**1.61**
Interquartile range	**1.64**	**0.19**	**0.75**
Mean	**2.89**	**0.51**	**1.91**
Standard deviation	**1.85**	**0.15**	**0.96**

Note: Radionuclide results are reported ±2σ in Bq/L. See Chapter 13, Quality Assurance.

[a] Wines from a variety of vintages were purchased and analyzed during 1997. The concentrations shown are not decay-corrected to vintage year.

11 Environmental Radiation Monitoring

Barbara C. Fields

Methods of Gamma Radiation Monitoring

External doses from gamma radiation are monitored at 14 Livermore site perimeter locations, 23 Livermore Valley locations, nine Site 300 perimeter locations, five near Site 300, and two in Tracy. Each quarter, thermoluminescent dosimeters (TLDs) are exchanged, data are read and analyzed, and the doses are calculated. Thermoluminescent dosimeters are prepared for field deployment every quarter. The process involves heat sealing TLDs into a foil sample pouch for protection against light and moisture. Direct gamma radiation doses are measured with reusable TLDs mounted in the field on preexisting structures (such as fences) at approximately 1 m above ground to comply with DOE Order 5400.1. The TLDs are installed with an LLNL identification label on each pouch. Additionally, duplicate trip blanks, transit control TLDs, and calibration control TLDs are prepared. Each quarter, the TLDs in the field are collected and replaced with a new batch of TLDs. The exposed TLDs are placed in a reading magazine by location and taken to the Dosimetry Laboratory for processing. A chain-of-custody form accompanies the collection and field deployment of the TLDs so that each responsible party, from collection to archiving, signs the form acknowledging that the task of assigned duties has been completed. Hazards Control reports the raw data results to the EPD analyst, who reviews, calculates, and analyzes the data for reporting. Details of the TLD calculations and reporting of external gamma radiation dose are described in procedure ORAD EMP-TLD-CALC.

When a TLD is damaged or lost, the associated annual dose value is calculated from the mean quarterly dose, as determined from available data, multiplied by four. Data from TLDs found on the ground open or damaged are not used to calculate the quarterly or annual totals. Such TLDs tend to trap moisture, and the readings can yield erroneous data.

LLNL uses the Panasonic Model UD-814AS1 TLD, which contains three components of thallium-activated calcium sulfate ($CaSO_4$) and one component of lithium borate ($Li_2B_4O_7$). Energy is stored when these compounds are exposed to gamma radiation. Impurities in the TLD crystal form low-temperature trapping sites for electrons that have been excited to higher energy states by gamma radiation at normal ambient temperatures. When the TLDs are heated in the analytical laboratory, the electrons return to lower energy states, and light is emitted. The light intensity is proportional to the original absorbed energy and is measured with a photomultiplier tube. After the TLD is read, it is heated again and reread. This second reading should be near zero, indicating that all the stored energy in the traps has been released and measured. This process, called annealing, also verifies that the TLD is again ready for field deployment.

Direct gamma radiation exposures are measured in milliroentgens (mR). The measured exposure is converted to dose by calibrating the dosimeters against sources that deliver a known absorbed dose and then applying a quality factor for a beta/gamma radiation field. The resultant dose equivalents, in millisieverts (mSv) or millirem (mrem), are compared to the DOE Order 5400.5 radiation protection standards. The doses at the site boundaries are also compared to background measurements to determine the contribution, if any, from LLNL operations.

To ensure accuracy in TLD measurements, some TLDs are irradiated each quarter to specific exposures for calibration purposes, and others are irradiated to specific exposures to serve as quality-control accuracy checks. Duplicate TLDs are located in the field at several locations each quarter to assess TLD measurement precision. Methods in our procedures and policies are to ensure that holding times are kept to a minimum so that we remain consistent with 90-day standard quarters. When the holding time exceeds the 90-day standard quarter, data are normalized (Struckmeyer 1994). Additionally, we participate in the National Intercomparison Laboratory Study for external gamma radiation measurements, and our processing complies with the DOE Environmental Measurement Laboratory standards.

Tables

Data tables for the 1997 gamma radiation monitoring network are presented below. **Table 11-1** presents the Livermore site perimeter data, **Table 11-2** presents the Livermore Valley data, **Table 11-3** presents the Site 300 perimeter, data, and **Table 11-4** presents Tracy and other Site 300 off-site data. Summary data are discussed in detail in the main volume of this report.

Table 11-1. Calculated dose (in mSv) from TLD environmental radiation measurements, Livermore site perimeter, 1997.

Location	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Total[a]
1	0.157	0.169	0.162	0.15	0.638
4	0.152	0.169	0.162	0.155	0.638
5	0.158	0.171	0.175	0.164	0.668
6	0.161	0.171	0.172	0.159	0.663
11	0.119	0.127	0.125	0.125	0.496
14	0.142	0.148	0.147	0.137	0.437
16	0.145	0.150	0.151	0.154	0.600
42	0.152	0.158	0.152	0.145	0.607
43	0.153	0.166	0.165	—[b]	0.645
47	0.129	0.144	0.144	0.136	0.553
52	0.136	0.145	0.146	0.143	0.570
56	0.142	0.148	0.152	0.145	0.587
68	0.148	0.162	0.153	0.148	0.611
69	0.134	0.149	0.141	0.134	0.558
mSv					
Mean	**0.145**	**0.156**	**0.153**	**0.146**	**0.601**
Standard deviation	**0.012**	**0.013**	**0.013**	**0.011**	
mrem					
Mean	**14.5**	**15.6**	**15.3**	**14.6**	**59.1**
Standard deviation	**1.2**	**1.3**	**1.3**	**1.1**	

a When a TLD is missing, the annual dose is calculated as four times the mean quarterly dose, as determined from available data.

b Sample damaged or lost in the field.

Table 11-2. Calculated dose (in mSv) from TLD environmental radiation measurements, Livermore Valley, 1997.

Location	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Total[(a)]
18	0.112	0.121	0.116	0.119	0.468
19	0.151	0.141	0.139	0.143	0.574
22	0.157	0.168	0.162	0.152	0.639
24	0.146	0.163	0.168	0.151	0.628
27	0.161	0.184	—[(b)]	0.140	0.647
28	0.157	—[(b)]	—[(b)]	0.166	0.646
30	0.140	0.173	0.175	—[(b)]	0.651
32	0.140	0.161	0.156	0.151	0.608
33	0.156	0.164	—[(b)]	0.158	0.637
35	—[(b)]	0.167	0.161	0.158	0.647
37	—[(b)]	0.152	0.156	0.157	0.620
45	0.136	0.150	0.148	0.145	0.579
57	0.150	0.170	0.167	0.160	0.647
60	0.148	0.157	0.152	0.145	0.602
61	0.137	0.149	0.140	0.132	0.558
66	0.156	0.164	0.158	0.153	0.631
70	0.136	—[(b)]	0.150	0.140	0.568
72	0.162	0.178	0.184	0.165	0.689
73	0.149	0.162	0.154	0.144	0.609
74	0.133	0.143	0.144	0.135	0.555
75	0.109	0.125	0.125	0.122	0.481
76	—[(b)]	—[(b)]	—[(b)]	0.132	0.528
77	0.137	0.151	0.142	0.138	0.568
mSv					
Mean	**0.144**	**0.157**	**0.152**	**0.146**	**0.599**
Standard deviation	**0.014**	**0.016**	**0.016**	**0.013**	
mrem					
Mean	**14.4**	**15.7**	**15.2**	**14.6**	**59.9**
Standard deviation	**1.4**	**1.6**	**1.6**	**1.3**	

a When a TLD is missing, the annual dose is calculated as four times the mean quarterly dose, as determined from available data.

b Sample damaged or lost in the field.

Table 11-3. Calculated dose (in mSv) from TLD environmental radiation measurements, Site 300 perimeter, 1997.

Location	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Total[(a)]
78	0.137	0.155	0.150	0.149	0.591
81	0.187	0.213	0.215	0.198	0.813
82	0.161	0.185	0.183	0.179	0.708
85	0.158	0.180	0.179	0.177	0.694
86	0.169	0.186	0.176	0.172	0.703
88	—[(b)]	0.176	0.180	0.179	0.713
89	0.176	0.197	0.194	0.173	0.740
91	0.172	0.194	0.197	0.179	0.742
121	0.184	0.210	0.207	0.195	0.796
mSv					
Mean	**0.168**	**0.188**	**0.187**	**0.178**	**0.722**
Standard deviation	**0.016**	**0.018**	**0.019**	**0.014**	
mrem					
Mean	**16.8**	**18.8**	**18.7**	**17.8**	**72.2**
Standard deviation	**1.61**	**1.78**	**1.92**	**1.41**	

[a] When a TLD is missing, the annual dose is calculated as four times the mean quarterly dose, as determined from available data.

[b] Sample damaged or lost in the field.

Table 11-4. Calculated dose (in mSv) from TLD environmental radiation measurements, Site 300 vicinity, 1997.

Location	Jan–Mar	Apr–Jun	Jul–Sep	Oct–Dec	Total[(a)]
Tracy					
92	0.161	0.169	0.172	0.16	0.662
93	0.135	0.152	0.151	0.142	0.58
mSv					
Mean	**0.148**	**0.161**	**0.162**	**0.151**	**0.621**
Standard deviation	**0.018**	**0.012**	**0.015**	**0.013**	
mrem					
Mean	**14.8**	**16.1**	**16.2**	**15.1**	**62.1**
Standard deviation	**0.018**	**0.012**	**0.015**	**0.013**	
Other off-site					
90	0.172	0.198	0.196	0.187	0.753
94	0.222	0.246	0.243	0.232	0.943
96	0.197	0.215	0.208	0.200	0.820
99	0.161	—[(b)]	0.174	0.161	0.661
120	0.162	0.180	0.178	0.165	0.685
mSv					
Mean	**0.183**	**0.210**	**0.200**	**0.189**	**0.772**
Standard deviation	**0.026**	**0.028**	**0.028**	**0.029**	
mrem					
Mean	**18.3**	**21.0**	**20.0**	**18.9**	**77.2**
Standard deviation	**2.63**	**2.81**	**2.78**	**2.89**	

a When a TLD is missing, the annual dose is calculated as four times the mean quarterly dose, as determined from available data.

b Sample damaged or lost in the field.

12

There are no supplemental data in this chapter. Please see the main volume for details about Radiological Dose Assessment.

13

Quality Assurance

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Sampling Location Designators

As described in Chapter 13 in the main volume, the LLNL environmental monitoring program uses alpha-numeric location designator codes to define sampling locations. **Tables 13-1** and **13-2** decode sampling location designators used in 1997 and provide a cross-reference between current designators and those used in previous years. Changes to location designators made during 1997 are shown on those tables. **Table 13-3** decodes sampling location designators that were used prior to but not during 1997.

Participation in Laboratory Intercomparison Studies

The LLNL Chemistry and Materials Science Environmental Services Environmental Monitoring Radiation Laboratory (CES EMRL) and the Hazards Control Department's Analytical Laboratory (HCAL) participated in both the Environmental Protection Agency's (EPA) Environmental Monitoring Systems Laboratory (EMSL) intercomparison studies program and the DOE Environmental Monitoring Laboratory (EML) intercomparison studies program in 1997. The results of CES EMRL's participation in the EMSL studies are presented in **Table 13-4**. A review of these data indicates that 37 of 37 analyses fell within established acceptance control limits. The results of HCAL's participation in 1997 EMSL studies are presented in **Table 13-5**. A review of these data indicates that 10 of 10 sample results fell within the 3-σ acceptance control limits.

The results of CES EMRL's participation in the EML studies are presented in **Table 13-6**. Review of these results shows that 82 of 84 results were within the established acceptance control limits. Unacceptably low values were obtained for curium-244 in vegetation in the QAP 046 study and strontium-90 in water in the QAP 047 study.

HCAL's EML results are presented in **Table 13-7**. Review of these results show that 10 of 10 results were within the established acceptance control limits.

The HCAL also participated in four EPA Water Pollution and Water Supply intercomparison studies for metals during 1997, as shown in **Table 13-8**. The HCAL measures aluminum, arsenic, beryllium, cadmium, chromium, copper, iron, lead, mercury, nickel, silver, and zinc in sewage effluent for the LLNL environmental monitoring program. Review of these results shows that 32 of 34 samples fell within established acceptance control limits. One zinc sample fell slightly outside the control limits in the WP035 study (limit was 84.9, reported value was 85). The actual value measured by the HCAL was 84.5; however, it was rounded to 85 because the existing method detection limit was only specified to two significant figures. Future studies will be reported to three significant figures as recommended by the EPA.

Contract laboratories are also required to participate in laboratory intercomparison programs; however, permission to publish their results for comparison purposes has not been granted.

Table 13-1. Livermore site and Livermore Valley sampling location designators for 1997.

Medium/location	Current designator	Previous designator(s)	Notes
Air particulate			
Altamont Pass	L-ALTA	90-07	Abandoned 5/97
Near Building 531	L-B531	—	
South Cafeteria (East Avenue)	L-CAFE	90-12	Also sampled for beryllium
Church (Livermore)	L-CHUR	—	Replaced L-RRCH, 6/97
Cow barn (northeast of Building 592)	L-COW	90-15	Also sampled for beryllium
UNCLE Credit Union (Greenville Road)	L-CRED	—	
FCC Station	L-FCC	90-08	
Firehouse (East Avenue)	L-FIRE	90-17	
Livermore VA Hospital	L-HOSP	90-10	
Livermore Water Reclamation Plant (LWRP)	L-LWRP	90-16	
West parking lot (Mesquite Way)	L-MESQ	90-02	Also sampled for beryllium
Met. Tower (northwest perimeter)	L-MET	90-13	Also sampled for beryllium
Patterson Pass	L-PATT	90-05	
Residence (Livermore)	L-RRCH	90-06	Replaced by L-CHUR, 6/97
Salvage (East Avenue)	L-SALV	90-01	Also sampled for beryllium
Sandia tanks	L-TANK	90-03	
Visitors Center (east perimeter)	L-VIS	90-14	
Zone 7	L-ZON7	90-04	Also sampled for beryllium
Air tritium			
Altamont Pass	L-ALTA	93-07	Abandoned, 5/97
Building 292 area	L-B292	—	
Building 331 yard	L-B331	—	
Building 514 yard	L-B514	—	
Building 624 (612 yard)	L-B624	—	
South Cafeteria (East Avenue)	L-CAFE	93-12	
Cow barn (northeast of Building 592)	L-COW	93-15	
Firehouse (East Avenue)	L-FIRE	93-17	
Livermore VA Hospital	L-HOSP	—	
West parking lot (Mesquite Way)	L-MESQ	93-02	
Met. Tower (northwest perimeter)	L-MET	93-13	
LLNL pool	L-POOL	—	
Salvage (East Avenue)	L-SALV	93-01	
Residence (west of Sandia)	L-VET	93-S2	
Visitors Center (east perimeter)	L-VIS	93-14	
Residence (Cross Road)	L-XRDS	93-S1	
Zone 7	L-ZON7	93-04	

Table 13-1. Livermore site and Livermore Valley sampling location designators for 1997 (continued).

Medium/location	Current designator	Previous designator(s)	Notes
Vegetation			
Aqueduct	L-AQUE	95-23	
Calaveras Reservoir	L-CAL	—	
FCC Station	L-FCC	95-33	
LLNL on-site garden	L-GARD	—	
I-580 and Greenville Road	L-I580	95-20	
Mesquite Way	L-MESQ	—	
Met. Tower (northwest perimeter)	L-MET	—	
Camp Parks	L-PARK	—	
Patterson Pass	L-PATT	95-04	
North perimeter fence (LLNL)	L-NPER	—	
Tesla Road (west)	L-TESW	95-32	
Visitors Center (east perimeter)	L-VIS	—	
Zone 7	L-ZON7	95-15	
Building 292, pine tree	L-PIN1	—	
Visitors Center, pine tree	L-PIN2	—	
Arroyo Sediment			
Arroyo Las Positas (east of LLNL)	L-ALPE	—	Added in 1997
Arroyo Seco South No. 2	L-ASS2	—	
Arroyo Seco West	L-ASW	L-ASN	
Drainage Retention Basin	L-CDB	CDB	
Eastern Settling Basin	L-ESB	—	
Greenville Road, northeast perimeter	L-GRNE	—	
West perimeter drainage channel	L-WPDC	—	
Soil			
Altamont Pass	L-AMON	—	Replaced L-ALTA in 1997
Cow barn (northeast of Building 592)	L-COW	L-15	
Church (Livermore)	L-CHUR	—	Replaced L-RRCH in 1997
FCC Station	L-FCC	L-08	
Livermore VA Hospital	L-HOSP	L-10	
West parking lot (Mesquite Way)	L-MESQ	L-02	
Met. Tower (northwest perimeter)	L-MET	L-13	
Northeast corner perimeter fence	L-NEP	L-18	
Patterson Pass	L-PATT	L-05	
Salvage (East Avenue)	L-SALV	—	

Table 13-1. Livermore site and Livermore Valley sampling location designators for 1997 (continued).

Medium/location	Current designator	Previous designator(s)	Notes
Soil (continued)			
Sandia tanks	L-TANK	L-03	
Visitors Center (east perimeter)	L-VIS	L-14	
LWRP (1/3 North)	L-WRP1	L-19	
LWRP (2/3 North)	L-WRP2	L-20	
LWRP (Northwest)	L-WRP3	L-21	
LWRP (1/3 West)	L-WRP4	L-22	
LWRP (2/3 West)	L-WRP5	L-23	
LWRP (Southwest)	L-WRP6	L-24	
Zone 7	L-ZON7	L-04	
Sewage			
Building 196 (daily composite)	L-B196	LLNL	
Building 196 (weekly composite)	L-C196	—	
LWRP (digester)	L-WRD1	—	
LWRP (digester)	L-WRD2	—	
LWRP (digester)	L-WRD3	—	
LWRP (effluent)	L-WRPE	—	
Runoff			
Arroyo Las Positas (east of LLNL)	L-ALPE	01	
Greenville Road (south of L-GRNE)	L-ALPO	—	
Arroyo Seco South No. 2	L-ASS2	—	
Southern influent to Arroyo Seco West (Vasco/East Avenue)	L-ASW	L-ASN; 06	
Drainage Retention Basin	L-CDB	02	
Eastern influent to Drainage Retention Basin	L-CDB2	—	
Drainage Retention Basin effluent	L-CDBX	—	Drainage Retention Basin release
Greenville Road (northeast perimeter)	L-GRNE	—	
West perimeter drainage channel	L-WPDC	—	Drainage Retention Basin release
Rain			
Aqueduct	L-AQUE	—	
Building 291	L-B291	—	
Building 343	L-B343	—	
Residence (Livermore)	L-BVA	—	
Drainage Retention Basin	L-CDB	—	
Cow barn (northeast of Building 592)	L-COW	—	
East of Sandia	L-ESAN	—	

Table 13-1. Livermore site and Livermore Valley sampling location designators for 1997 (concluded).

Medium/location	Current designator	Previous designator(s)	Notes
Rain (continued)			
Greenville and Tesla roads	L-GTES	—	
Met. Tower (northwest perimeter)	L-MET	—	
Salvage (East Avenue)	L-SALV	—	
Residence (Livermore)	L-SLST	—	
Residence (west of Sandia)	L-VET	—	
Vineyard	L-VINE	—	
Visitors Center (east parameter)	L-VIS	—	
Zone 7	L-ZON7	—	
Water			
Arroyo de Laguna (Sunol)	L-ALAG	92-24	
Residence (Livermore)	L-BELL	92-37	
Calaveras Reservoir	L-CAL	92-29	
Del Valle Lake	L-DEL	92-11	
Springtown duck pond	L-DUCK	92-16	
Gas station tap water	L-GAS	92-19	
Private well	L-ORCH	92-34	
Residence (Livermore)	L-PALM	92-31	
LLNL pool	L-POOL	92-43	
Shadow Cliffs	L-SHAD	92-26	
Building 151 tap water	L-TAP	92-30	
Zone 7	L-ZON7	92-15	
Drainage Retention Basin			
Surface water (shallow) location	L-CDBA	—	
Surface water (shallow) location	L-CDBC	—	
Surface water location	L-CDBD	—	
Mid-depth location	L-CDBE	—	
Bottom location	L-CDBF	—	
Surface water location	L-CDBJ	—	
Mid-depth location	L-CDBK	—	
Bottom location	L-CDBL	—	

Table 13-2. Site 300 sampling location designators for 1997.

Medium/location	Current designator	Previous designator(s)	Notes
Air particulate			
East of Building 801	3-801E	40-10	Also sampled for beryllium
East control post	3-ECP	40-02	
East observation point	3-EOBS	40-01	Also sampled for beryllium
West of main gate	3-GOLF	40-05	Also sampled for beryllium
Linac Road	3-LIN	40-04	
North power station	3-NPS	40-08	
Tracy firehouse	3-TFIR	40-06	Also sampled for beryllium
West control post	3-WCP	40-03	
West observation point	3-WOBS	40-09	
Air tritium			
Physics International	3-PRIM	—	Added in 1997
Soil			
East of Building 801	3-801E	3NXXH01 or 1114	
North of Building 801	3-801N	1117	
West of Building 801	3-801W	3NNWG01 or 1113	
Behind Building 812	3-812N	3NXXC01 or 1115	
West of Building 834	3-834W	3ESEI01 or 1103	
North of road to Building 851	3-851N	3WNWI01 or 1107	
North of Building 856	3-856N	3WXXK01 or 1106	
Near Building 858	3-858S	3WSWI01 or 1104	
West landfill (Disposal Site West)	3-DSW	3NWXP02 or 1111	
North of east observation point	3-EOBS	3NNWL01 or 1112	
Evaporator (north of Well 8)	3-EVAP	3WNWK01 or 1109	
Golf course (west of main gate)	3-GOLF	3SEXL01 or 1116	
North Power Station	3-NPS	3NWXP01 or 1110	
West Observation Post	3-WOBS	3WNWN01 or 1108	
Vegetation			
East of Building 801	3-801E	45-12	
Carnegie	3-CARN	45-01	
West landfill (Disposal Site West)	3-DSW	45-06	
Near Well 8	3-EVAP	45-13	
Geodetic Creek	3-GEO	45-03	
West of main gate	3-GOLF	45-02	
PRIMEX/Physics International	3-PRIM	—	

Table 13-2. Site 300 sampling location designators for 1997 (continued).

Medium/location	Current designator	Previous designator(s)	Notes
Water			
Monitoring well	3-W35A04	—	
Private well	3-CON1	42-07	
Private well	3-CON2	—	
Well 18	3-WELL18	42-22	
Rain	3-RAIN	42-20	
812 creek	3-812CRK	42-21	
Carnegie Ranger Well 1 (private)	3-CARNRW1	42-23	
Carnegie Ranger Well 2 (private)	3-CARNRW2	42-24	
Well 20	3-WELL20	42-31	
Private well	3-GALLO1	42-28	
CDF well	3-CDF1	42-27	
Private well	3-MUL1	—	
Private well	3-MUL2	—	
Private well	3-VIE1	—	
Private well	3-VIE2	—	
Private well	3-STN	—	
Cooling towers			
Building 801	3-B801	—	
Building 812	3-B812	—	
Building 836, Tower A	3-B836A	—	
Building 865	3-B865	—	
Runoff			
North of Well NC2-07	3-NLIN	—	
East of Pit 6	3-N829	—	
South of B873	3-N883	—	
Pit 7 North Stilling Basin	3-NPT7	—	
Corral Hollow Creek	3-NSTN	—	
South East End of Pit 6	3-NPT6	—	
Corral Hollow Creek	3-GEOCRK	—	
Carnegie State Recreational Vehicle Area	3-CARW	—	

Table 13-2. Site 300 sampling location designators for 1997 (concluded).

Medium/location	Current designator	Previous designator(s)	Notes
WDR-96-248			
Photo process rinse water	801-R3O1	—	
	823-R1U1	—	
	851-R1A1	—	
S300 photo process developer and fixer	850-R1A1	—	
	850-R1A2	—	
Chemistry area wastewater	825-BAKER	—	
	827A-R1A1	—	
	827C-R1A1	—	
	827E-R2A1	—	
Explosives process area wastewater	3-B806	—	
	3-B809	—	
Explosives pressing machine	3-817	—	
Sewage pond effluent	3-ESWP	—	
	3-ISWP	—	

Table 13-3. Previously used sampling location designators not used in 1997.

Medium/location	Location designator	Previous designator(s)	Notes
Livermore site and Livermore Valley			
Air particulate			
Residence (Livermore)	L-ERCH	90-11	Abandoned 10/95
Livermore City Corp Yard	L-LCCY	90-09	Abandoned in 1994
Air tritium			
Livermore City Corp Yard	L-LCCY	93-09	Abandoned in 1994
Cow milk			
Residence (Livermore)	L-WRD	—	Abandoned prior to 1994
Goat milk			
Cartoned milk	C-CART	91-97	Abandoned in 1994
Residence (Modesto)	C-MOD	91-12	Abandoned in 1994
Residence (Modesto)	C-MOD2	—	Abandoned in 1994
Residence (Ripon)	C-RIP	—	Abandoned in 1994
Residence (Stevenson)	C-STEV	—	Abandoned in 1994
Prepasteurized (Turlock)	C-TUR	—	Abandoned in 1994
Residence (Brentwood)	C-WOOD	—	Abandoned in 1994
Residence (Livermore)	L-COOL	—	Abandoned prior to 1994
Residence (Livermore)	L-LUP	91-13	Replaced prior to 1994
Residence (Livermore)	L-MZF	91-07	Abandoned prior to 1994
Residence (Livermore)	L-WRD	91-05	Abandoned in 1994
Vegetation			
Residence (Modesto)	C-MOD	—	Abandoned prior to 1996
Residence (Danville)	L-DAN	—	Abandoned prior to 1996
North of LLNL (railroad tracks)	L-RAIL	95-29	Abandoned prior to 1996
Vasco Road (west of LLNL)	L-VASW	95-31	Replaced by L-MESQ and L-MET
Arroyo sediment			
East of Building 438	L-438E	—	Abandoned in 1994
4th and A streets	L-4THA	—	Abandoned in 1994
Arroyo Las Positas North	L-ALPN	—	Abandoned in 1994
Arroyo Las Positas West	L-ALPW	ALPW	Abandoned in 1994
Arroyo Seco East	L-ASE	ASE	Abandoned prior to 1994
Arroyo Seco South	L-ASS	ASS	Replaced by L-ASS2
Drainage Retention Basin 2	L-CDB2	—	Abandoned prior to 1997

Table 13-3. Previously used sampling location designators not used in 1997 (continued).

Medium/location	Location designator	Previous designator(s)	Notes
Soil			
Altamont Pass	L-ALTA	—	Abandoned prior to 1997
South Cafeteria (East Avenue)	L-CAFE	—	Abandoned prior to 1997
Residence (Livermore)	L-ERCH	—	Abandoned prior to 1997
Residence (Livermore)	L-RRCH	—	Abandoned prior to 1997
Sewage			
Manhole 163A (Sandia)	L-163A	—	
LWRP	L-LWRP	LWRP	Replaced by L-WRPE
Manhole 125C	L-M125	L-125C	
Manhole 177E	L-M177	L-177E	
Manhole 185F	L-M185	L-185F	
Manhole 231A	L-M231	L-231A	
Manhole 238C	L-M238	L-238C	
Manhole 40B	L-M40	L-40C	
Manhole 51A	L-M51	L-51A	
Manhole 53A	L-M53	L-53A	
Manhole 69A	L-M69	L-69A	
Manhole 86B	L-M86	L-86B	
Runoff			
4th and A streets	L-4THA	07	Abandoned prior to 1994
Arroyo Las Positas (north at cowbarn)	L-ALPN	09	Abandoned prior to 1994
Arroyo Las Positas (northwest boundary)	L-ALPW	03	Abandoned prior to 1994
Arroyo Seco East (influent to Sandia)	L-ASE	04	Abandoned prior to 1994
Arroyo Seco South (west parking lot)	L-ASS	06	Replaced by L-ASS2
East of Building 438	L-B438	08	Abandoned prior to 1994
Rain			
Altamont	L-ALTA	—	Abandoned prior to 1994
Del Valle/Zone 7	L-DEL7	—	Abandoned prior to 1994
FCC station	L-FCC	—	Abandoned prior to 1994
Camp Parks	L-PARK	—	Abandoned prior to 1994
Patterson Pass	L-PATT	—	Abandoned prior to 1994

Table 13-3. Previously used sampling location designators not used in 1997 (concluded).

Medium/location	Location designator	Previous designator(s)	Notes
Site 300			
Air Particulate			
Linac Road	3-LIN	40-04	Replaced by 3-PRIM prior to 1997
Water			
Well 1	3-WELLO1	42-01	Abandoned
Private well	3-GALLO2	—	Abandoned prior to 1994
Cooling Towers			
Building 805	3-B805	—	Removed from network in 1996
Building 809	3-B809	—	Removed from network in 1996
Building 810	3-B810	—	Removed from network in 1996
Building 815	3-B815	—	Removed from network in 1996
Building 817	3-B817	—	Removed from network in 1996
Building 826	3-B826	—	Removed from network in 1996
Building 827, Tower No. 1	3-B827-1	—	Removed from network in 1996
Building 827, Tower No. 2	3-B827-2	—	Removed from network in 1996
Building 828	3-B828	—	Removed from network in 1996
Building 836, Tower D	3-B836D	—	Removed from network in 1996
Building 851, Tower No. 1	3-B851-1	—	Removed from network in 1996
Building 851, Tower No. 2	3-B851-2	—	Removed from network in 1996
Building 854	3-B854	—	Removed from network in 1996

Table 13-4. LLNL Chemistry and Materials Science Environmental Services Environmental Monitoring Radiation Laboratory (CES EMRL) performance in the EPA Environmental Monitoring Systems Laboratory (EMSL) Intercomparison Studies Program for Water, 1997.

Analysis	Date	LLNL value (pCi/L)	Known value (pCi/L)	Control limits (3σ)	Warning limits (2σ)	Performance[a]
Ba-133	6/6/97	23.4	25.0	16.3–33.7	19.2–30.8	Acceptable
	11/7/97	92.3	99.0	81.7–116.3	87.4–110.6	Acceptable
Co-60	4/15/97	19.0	21.0	12.3–29.7	15.2–26.8	Acceptable
	6/6/97	20.3	18.0	9.3–26.7	12.2–23.8	Acceptable
	11/7/97	25.7	27.0	18.3–35.7	21.2–32.8	Acceptable
Cs-134	4/15/97	26.7	31.0	22.3–39.7	25.2–36.8	Acceptable
	6/6/97	23.0	22.0	13.3–30.7	16.2–27.8	Acceptable
	11/7/97	11.0	10.0	1.3–18.7	4.2–15.8	Acceptable
Cs-137	4/15/97	22.0	22.0	13.3–30.7	16.2–27.8	Acceptable
	6/6/97	50.3	49.0	40.3–57.7	43.2–54.8	Acceptable
	11/7/97	78.0	74.0	65.3–82.7	68.2–79.8	Acceptable
Gross alpha	1/31/97	3.77	5.2	0.0–13.9	0.0–11.0	Acceptable
	4/15/97	52.3	48.0	27.2–68.8	34.1–61.9	Acceptable
	7/18/97	3.23	3.1	0.0–11.8	0.0–8.9	Acceptable
	10/31/97	10.3	14.7	6.0–23.4	8.9–20.5	Acceptable
Gross beta	1/31/97	16.2	14.7	6.0–23.4	8.9–20.5	Acceptable
	4/15/97	126.0	102.1	75.6–128.6	84.4–119.8	Warning
	7/18/97	19.1	15.1	6.4–23.8	9.3–20.9	Acceptable
	10/31/97	54.3	48.9	40.2–57.6	43.1–54.7	Acceptable
Ra-226	2/14/97	5.3	5.9	4.3–7.5	4.9–6.9	Acceptable
	4/15/97	12.3	13.0	9.5–16.5	10.7–15.3	Acceptable
	6/13/97	2.4	3.0	2.1–3.9	2.4–3.6	Acceptable
	9/12/97	16.0	20.0	14.8–25.2	16.5–23.5	Warning
Ra-228	2/14/97	6.63	8.2	4.6–11.8	5.8–10.6	Acceptable
	4/15/97	3.23	3.1	1.7–4.5	2.2–4.0	Acceptable
	6/13/97	2.10	3.1	1.7–4.5	2.2–4.0	Warning
	9/12/97	6.40	8.0	4.5–11.5	5.7–10.3	Acceptable
Sr-89	4/15/97	27.0	24.0	15.3–32.7	18.2–29.8	Acceptable
Sr-90	4/15/97	14.0	13.0	4.3–21.7	7.2–18.8	Acceptable
Tritium	3/7/97	7597	7900	6529–9271	6985–8814	Acceptable
	8/8/97	11,000	11,010	9100–12920	9736–12280	Acceptable
U-natural	2/14/97	24.77	27.0	21.8–32.2	23.5–30.5	Acceptable
	4/15/97	22.4	24.0	18.8–29.2	20.5–27.5	Acceptable
	6/13/97	38.5	40.3	33.4–47.2	35.7–44.9	Acceptable
	9/12/97	4.87	5.1	0–10.3	1.6–8.6	Acceptable
Zn-65	6/6/97	98.9	100.0	82.7–117.3	88.4–111.6	Acceptable
	11/7/97	83.3	75.0	61.1–88.9	65.7–84.3	Acceptable

[a] Data are considered acceptable when they fall within the 2σ warning limits. Data should be checked for error when they are between the 2σ warning limits and the 3σ control limits. Data are considered unacceptable when they are outside the 3σ control limits.

Table 13-5. LLNL Hazards Control Analytical Laboratory (HCAL) performance in the EPA Environmental Monitoring Systems Laboratory (EMSL) Intercomparison Program for Water, 1997.

Analysis	Date	LLNL value (pCi/L)	Known value (pCi/L)	Control limits (3σ)	Warning limits (2σ)	Performance[a]
Gross alpha	1/31/97	6.53	5.2	0.0–13.9	0.0–11.0	Acceptable
	7/18/97	6.2	3.1	6.0–23.4	0.0–8.9	Acceptable
	10/31/97	17.23	14.7	0.0–11.8	8.9–20.5	Acceptable
	10/21/97[b]	38.7	49.9	28.2–71.6	35.4–64.4	Acceptable
Gross beta	1/31/97	15.3	14.7	6.0–23.4	8.9–20.5	Acceptable
	7/18/97	15.37	15.1	6.4–23.8	9.3–20.9	Acceptable
	10/31/97	55.1	48.9	40.2–57.6	43.1–54.7	Acceptable
	10/21/97[b]	147.0	143.4	106.1–180.7	118.5–168.3	Acceptable
Tritium	3/7/97	7520	7900	6529–9271	6985–8814	Acceptable
	8/8/97	10218	11010	9100–12920	9736–12285	Acceptable

a Data are considered acceptable when they fall within the 2σ warning limits. Data should be checked for error when they are between the 2σ warning limits and the 3σ control limits. Data are considered unacceptable when they are outside the 3σ control limits.

b Blind study.

Table 13-6. LLNL's Chemistry and Materials Science's Environmental Services (CES) Environmental Monitoring Radiation Laboratory's (EMRL) results from the DOE Environmental Measurements Laboratory (EML) Quality Assurance Program, 1997.

Medium (units)	Analysis	Study	LLNL value	EML value	LLNL/ EML	Control limits (3σ ratio)	Warning limits (2σ ratio)	Performance
Air filter (Bq/filter)	Am-241	QAP 46	0.161	0.152	1.059	0.69–1.92	0.84–1.33	Acceptable
		QAP 47	0.220	0.210	1.030	0.69–1.92	0.84–1.33	Acceptable
	Ce-144	QAP 46	15.1	15.7	0.962	0.58–1.26	0.66–1.10	Acceptable
		QAP 47	17.2	19.12	0.890	0.58–1.26	0.66–1.10	Acceptable
	Co-57	QAP 46	11.2	10.8	1.036	0.62–1.28	0.69–1.10	Acceptable
		QAP 47	11.9	12.64	0.940	0.62–1.28	0.69–1.10	Acceptable
	Co-60	QAP 46	5.01	5.01	1.000	0.75–1.27	0.82–1.10	Acceptable
		QAP 47	9.83	10.73	0.920	0.75–1.27	0.82–1.10	Acceptable
	Cs-134	QAP 46	12.0	10.88	1.103	0.73–1.22	0.81–1.11	Acceptable
		QAP 47	27.4	28.2	0.970	0.73–1.22	0.81–1.11	Acceptable
	Cs-137	QAP 46	8.51	8.70	0.978	0.72–1.33	0.82–1.11	Acceptable
		QAP 47	6.85	7.31	0.930	0.72–1.33	0.82–1.11	Acceptable
	Gross alpha	QAP 46	1.04	0.960	1.083	0.45–1.57	0.80–1.34	Acceptable
		QAP 47	1.62	1.49	1.080	0.45–1.57	0.80–1.34	Acceptable
	Gross beta	QAP 46	0.627	0.450	1.393	0.66–1.77	0.89–1.48	Acceptable
		QAP 47	3.62	3.00	1.200	0.50–1.77	0.80–1.48	Acceptable
	Mn-54	QAP 46	7.83	7.62	1.028	0.76–1.32	0.83–1.11	Acceptable
		QAP 47	6.44	6.72	0.960	0.76–1.32	0.83–1.11	Acceptable
	Pu-238	QAP 46	0.113	0.100	1.128	0.63–1.46	0.84–1.14	Acceptable
		QAP 47	0.210	0.210	1.010	0.63–1.46	0.84–1.14	Acceptable
	Pu-239	QAP 46	0.132	0.119	1.111	0.67–1.59	0.88–1.17	Acceptable
		QAP 47	0.110	0.100	1.010	0.67–1.59	0.88–1.17	Acceptable
	Sb-125	QAP 46	14.1	12.33	1.144	0.58–1.36	0.81–1.14	Warning
		QAP 47	17.6	16.12	1.090	0.58–1.36	0.81–1.14	Acceptable
	U-234	QAP 46	0.098	0.103	0.954	0.79–2.01	0.89–1.42	Acceptable
	U-238	QAP 46	0.095	0.105	0.906	0.76–2.41	0.88–1.33	Acceptable
		QAP 47	0.050	0.050	0.950	0.76–2.41	0.88–1.33	Acceptable
	U (µg)	QAP 46	7.670	8.448	0.908	0.52–1.86	0.80–1.27	Acceptable
		QAP 47	4.45	4.65	0.950	0.52–1.86	0.80–1.27	Acceptable

Table 13-6. LLNL's Chemistry and Materials Science's Environmental Services Environmental Monitoring Radiation Laboratory's results from the DOE Environmental Measurements Laboratory (EML) Quality Assurance Program, 1997 (continued).

Medium (units)	Analysis	Study	LLNL value	EML value	LLNL/ EML	Control limits (3σ ratio)	Warning limits (2σ ratio)	Performance
Soil (Bq/kg)	Am-241	QAP 46	6.62	5.68	1.165	0.52–2.65	0.75–1.52	Acceptable
		QAP 47	10.6	6.04	1.750	0.52–2.65	0.75–1.52	Warning
	Co-60	QAP 46	1.68	1.06	1.585	0.80–2.00	0.90–1.30	Warning
		QAP 47	1.25	1.50	0.830	0.80–2.00	0.90–1.30	Warning
	Cs-137	QAP 46	832.0	825.5	1.008	0.80–1.34	0.90–1.23	Acceptable
		QAP 47	768.0	810.0	0.940	0.80–1.34	0.90–1.23	Acceptable
	K-40	QAP 46	316.0	334.3	0.945	0.73–1.67	0.85–1.27	Acceptable
		QAP 47	284.0	315.0	0.900	0.73–1.67	0.85–1.27	Acceptable
	Pu-238	QAP 46	0.561	0.530	1.059	0.40–1.90	0.73–1.16	Acceptable
		QAP 47	0.440	0.440	1.010	0.40–1.90	0.73–1.16	Acceptable
	Pu-239	QAP 46	157.0	134.93	1.164	0.66–1.93	0.87–1.26	Acceptable
		QAP 47	10.8	10.2	1.060	0.66–1.93	0.87–1.26	Acceptable
	U-234	QAP 46	34.0	37.6	0.905	0.38–1.55	0.63–1.10	Acceptable
		QAP 47	33.0	37.2	0.880	0.38–1.55	0.63–1.10	Acceptable
	U-238	QAP 46	33.8	42.4	0.797	0.35–1.55	0.61–1.10	Acceptable
		QAP 47	30.5	34.9	0.870	0.35–1.55	0.61–1.10	Acceptable
	U (µg/Kg)	QAP 46	2.74	3.43	0.800	0.34–1.27	0.53–1.10	Acceptable
		QAP 47	2.45	2.82	0.860	0.34–1.27	0.53–1.10	Acceptable
Vegetation (Bq/kg)	Am-241	QAP 46	1.54	1.18	1.301	0.68–2.78	0.86–1.57	Acceptable
		QAP 47	4.24	3.46	1.220	0.68–2.78	0.86–1.57	Acceptable
	Cm-244	QAP 46	0.859	0.900	0.954	0.49–1.69	0.83–1.41	Acceptable
		QAP 47	1.15	2.75	0.410	0.49–1.69	0.83–1.41	Unacceptable
	Co-60	QAP 46	13.7	12.5	1.096	0.62–1.42	0.81–1.20	Acceptable
		QAP 47	28.30	32.4	0.870	0.62–1.42	0.81–1.20	Acceptable
	Cs-137	QAP 46	202.0	189.3	1.067	0.80–1.45	0.90–1.25	Acceptable
		QAP 47	618.0	624.0	0.990	0.80–1.45	0.90–1.25	Acceptable
	K-40	QAP 46	838.0	811.5	1.033	0.79–1.50	0.90–1.24	Acceptable
		QAP 47	1060	1130	0.940	0.79–1.50	0.90–1.24	Acceptable
	Pu-239	QAP 46	2.24	1.94	1.153	0.65–1.95	0.85–1.32	Acceptable
		QAP 47	5.98	5.48	1.090	0.65–1.95	0.85–1.32	Acceptable

Table 13-6. LLNL's Chemistry and Materials Science's Environmental Services Environmental Monitoring Radiation Laboratory's results from the DOE Environmental Measurements Laboratory (EML) Quality Assurance Program, 1997 (concluded).

Medium (units)	Analysis	Study	LLNL value	EML value	LLNL/ EML	Control limits (3σ ratio)	Warning limits (2σ ratio)	Performance
Water (Bq/L)	Am-241	QAP 46	0.941	0.837	1.125	0.68–1.56	0.88–1.23	Acceptable
		QAP 47	0.830	0.750	1.110	0.68–1.56	0.88–1.23	Acceptable
	Co-60	QAP 46	90.0	90.9	0.991	0.80–1.18	0.90–1.13	Acceptable
		QAP 47	21.7	23.3	0.930	0.80–1.18	0.90–1.13	Acceptable
	Cs-134	QAP 47	69.5	66.0	1.050	0.89–1.25	0.90–1.16	Acceptable
	Cs-137	QAP 46	72.9	69.8	1.045	0.80–1.27	0.90–1.18	Acceptable
		QAP 47	36.6	34.3	1.060	0.80–1.27	0.90–1.18	Acceptable
	Gross alpha	QAP 46	1020	1130	0.900	0.37–1.27	0.82–1.14	Acceptable
		QAP 47	562	557	1.000	0.37–1.50	0.80–1.20	Acceptable
	Gross beta	QAP 46	633	744	0.850	0.55–1.63	0.73–1.38	Acceptable
		QAP 47	1050	712	1.470	0.50–1.63	0.73–1.38	Warning
	Mn-54	QAP 46	22.5	20.85	1.079	0.80–1.22	0.90–1.16	Acceptable
		QAP 47	38.3	37.8	1.010	0.80–1.22	0.90–1.16	Acceptable
	Pu-238	QAP 46	1.37	1.291	1.061	0.73–1.27	0.90–1.12	Acceptable
		QAP 47	0.760	0.720	1.060	0.73–1.27	0.90–1.12	Acceptable
	Pu-239	QAP 46	0.864	0.850	1.016	0.78–1.41	0.90–1.18	Acceptable
		QAP 47	0.780	0.750	1.040	0.78–1.41	0.90–1.18	Acceptable
	Sr-90	QAP 46	2.91	23.2	0.125	0.71–1.65	0.88–1.31	Unacceptable
	Tritium	QAP 46	255	250	1.019	0.62–1.80	0.79–1.22	Acceptable
		QAP 47	124	115	1.080	0.62–1.80	0.79–1.22	Acceptable
	U-234	QAP 46	0.494	0.540	0.915	0.75–1.44	0.90–1.21	Acceptable
		QAP 47	0.260	0.230	1.160	0.75–1.44	0.90–1.21	Acceptable
	U-238	QAP 46	0.520	0.550	0.946	0.77–1.34	0.90–1.16	Acceptable
		QAP 47	0.250	0.240	1.050	0.77–1.34	0.90–1.16	Acceptable
	U (µg)	QAP 46	0.042	0.044	0.948	0.73–1.34	0.89–1.15	Acceptable
		QAP 47	0.020	0.020	1.010	0.73–1.34	0.89–1.15	Acceptable

[a] Data are considered acceptable when they fall within the 2σ warning limits. Data should be checked for error when they are between the 2σ warning limits and the 3σ control limits. Data are considered unacceptable when they are outside the 3σ control limits.

Table 13-7. LLNL's Hazards Control Analytical Laboratory results from the DOE Environmental Measurements Laboratory (EML) Quality Assurance Program, 1997.

Medium (units)	Analysis	Study	LLNL value	EML value	LLNL/ EML	Control limits (3σ ratio)	Warning limits (2σ ratio)	Performance
Air filters (Bq/filter)	gross alpha	QAP 46	0.894	0.960	0.931	0.45–1.57	0.80–1.34	Acceptable
		QAP 47	1.30	1.49	0.870	0.45–1.57	0.80–1.34	Acceptable
	gross beta	QAP 46	0.396	0.450	0.880	0.66–1.77	0.89–1.48	Acceptable
		QAP 47	2.42	3.00	0.800	0.50–1.77	0.80–1.48	Acceptable
Water (Bq/L)	gross alpha	QAP 46	1132	1130	1.000	0.37–1.27	0.82–1.14	Acceptable
		QAP 47	513.0	557.0	0.920	0.37–1.50	0.80–1.20	Acceptable
	gross beta	QAP 46	564	744	0.750	0.55–1.63	0.73–1.38	Acceptable
		QAP 47	967	712	1.350	0.50–1.63	0.73–1.38	Acceptable
	Tritium	QAP 46	247	250	0.987	0.62–1.80	0.79–1.22	Acceptable
		QAP 47	110	115	0.950	0.62–1.80	0.79–1.22	Acceptable

[a] Data are considered acceptable when they fall within the 2σ warning limits. Data should be checked for error when they are between the 2σ warning limits and the 3σ control limits. Data are considered unacceptable when they are outside the 3σ control limits.

Table 13-8. Hazards Control Department Analytical Laboratory results from the Environmental Protection Agency (EPA) Water Pollution and Water Supply Studies.[(a)]

Analysis	Study	Sample	LLNL value[(a)] (µg/L)	True value[(a)] (µg/L)	Acceptable limits[(b)] (µg/L)	Warning limits[(b)] (µg/L)	Performance
Aluminum	WP037	01	1240	1203	1030–1360	1070–1310	Acceptable
	WP038	01	1960	1903	1690–2150	1740–2090	Acceptable
Arsenic	WS038	001	82.4	83.1	71.7–88.4	na	Acceptable
	WP037	01	93.8	88.0	69.6–107	74.3–102	Acceptable
	WP038	01	400	410	344–478	361–461	Acceptable
Beryllium	WS038	001	9.60	10.1	8.59–11.6	na	Acceptable
	WP037	02	730	675	601–750	620–731	Acceptable
	WP038	02	6.80	8.25	4.87–11.2	5.66–10.4	Acceptable
Cadmium	WS038	001	2.06	2.12	1.70–2.54	na	Acceptable
	WP037	01	20.3	22.2	18.3–26.4	19.4–25.4	Acceptable
	WP038	01	67.0	69.0	58.5–78.6	61.1–76.1	Acceptable
Chromium	WS038	001	143	148	126–170	na	Acceptable
	WP037	01	145	137	120–156	124–151	Acceptable
	WP038	01	421	420	371–473	384–460	Acceptable
Copper	WS038	001	1120	1203	1080–1320	na	Acceptable
	WP037	01	114	115	102–128	105–124	Acceptable
	WP038	01	269	277	252–305	259–298	Acceptable
Iron	WP037	01	422	393	350–445	362–433	Acceptable
	WP038	01	2040	2100	1890–2280	1940–2230	Acceptable
Lead	WS038	001	55.0	56.2	39.3–73.1	na	Acceptable
	WS039	001	17.9	16.0	11.2–20.8	na	Acceptable
	WP037	01	112	130	109–147	114–143	Warning
	WP038	01	426	430	379–480	392–467	Acceptable
Mercury	WS038	001	6.04	6.39	4.47–8.31	na	Acceptable
	WP037	01	0.2	0.494	0.266–0.729	0.324–0.671	Unacceptable
	WP038	01	3.84	3.85	2.87–4.3	3.04–4.12	Acceptable
Nickel	WS038	001	220	240	204–276	na	Acceptable
	WP037	01	423	417	376–463	387–452	Acceptable
	WP038	01	190	188	168–213	174–207	Acceptable
Silver	WP037	02	504	490	455–557	468–544	Acceptable
	WP038	02	73.0	60.0	51.7–67.7	53.7–65.7	Unacceptable
Zinc	WS038	001	2750	2914	2620–3080	na	Acceptable
	WP037	01	299	296	263–332	272–323	Acceptable
	WP038	01	1640	1551	1360–1760	1410–1710	Acceptable

a All results reported in µg/L. Based upon theoretical calculations or a reference value when necessary.

b Acceptance limits are a 99% confidence interval calculated from available performance evaluation data of EPA and state laboratories. Warning limits are a 95% confidence interval produced in the same way as the acceptable limits. Results should fall within acceptable limits 99 times out of 100. Results outside warning limits but inside acceptable limits should be reviewed for possible problems but are not necessarily considered unacceptable.

na = None available from EPA water supply studies.

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